JUNE 14, 1954

Electrical World

Price 35 Cents

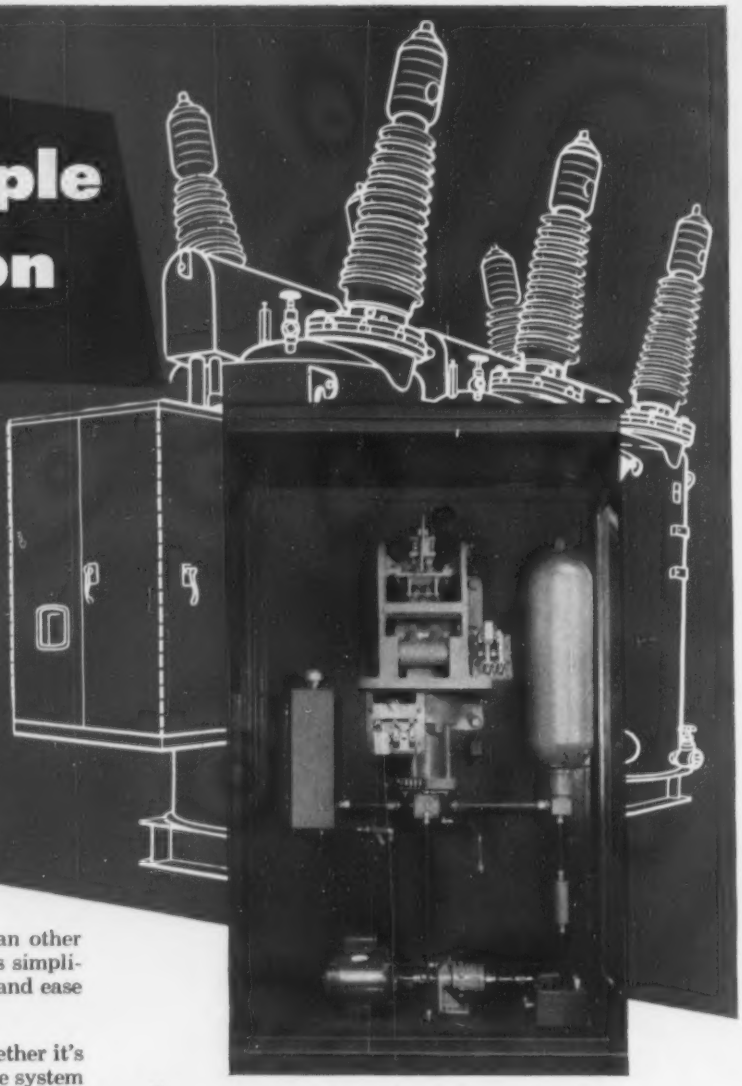
A McGRAW-HILL PUBLICATION

HAROLD QUINTON

PRESIDENT
EDISON ELECTRIC INSTITUTE
AND
SOUTHERN CALIFORNIA EDISON CO

Electrical World covers 22nd EEI convention in editorials, news, and reports

New principle of operation



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Breaker Operator offers 7 advantages

By using the hydraulic principle of energy transmission — new to the breaker industry — Allis-Chalmers is able to offer an operating mechanism with outstanding advantages.

1 Simple — Has fewer parts than other types of operating mechanisms. Its simplicity is a measure of its reliability and ease of maintenance.

2 Unaffected by Weather — Whether it's hot or cold, the energy stored in the system provides more than the standard number of operations. Use of oil with constant viscosity over wide range of temperatures insures uniform performance.

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5 Fast — In fact, it actually could be set to operate at speeds far faster than present useful speeds.

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7 Mechanically trip-free — The simple mechanically trip-free mechanism, proven on other Allis-Chalmers high speed breakers, has been adapted to the *Pneu-Draulic* operator. A-4285

The *Pneu-Draulic* operator is now available on breakers 69 kv and above. Watch for it on other ratings.

It will be to your advantage to investigate further the *Pneu-Draulic* operator and other features of these breakers. Call your nearby A-C district office for additional information, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Pneu-Draulic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

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Heads Edison, EEI

HAROLD QUINTON

Harold Quinton, newly elected president of Edison Electric Institute, took over the helm of Southern California Edison Co this spring. This promotion came 12 years after joining the utility. Then he was named vice president in charge of finance, becoming executive vice president in 1948.

Quinton's rise parallels Edison's growth.

Progress Report . . . Edison's progress for the years 1944 through 1953 is shown in these statistics: Gross revenues increased from $64,686,942 to $141,509,755; net income from $10,139,513 to $21,872,010; operating expenses and taxes from $49,683,618 to $111,727,792; and electric plant investment from $361,974,741 to $769,214,447.

Edison's Power Giant . . . The utility's dedication this spring of the $41-million outdoor Etiwanda steam plant is another milestone in the company's history. Etiwanda Station, which has a capacity of 265,000 kw, joins the utility's four other steam stations. Two others are now under construction at Redondo and El Segundo.

Edison's trend to steam stations marks a departure from a predominantly hydro utility, especially Hoover Dam's hydro.

The company is planning for more "boom" years. For example, it expects to construct a new reservoir and hydro plant known as Mammoth Pool. Energy is estimated at 550 million kwhr per year.

Electrical World

Published for 80 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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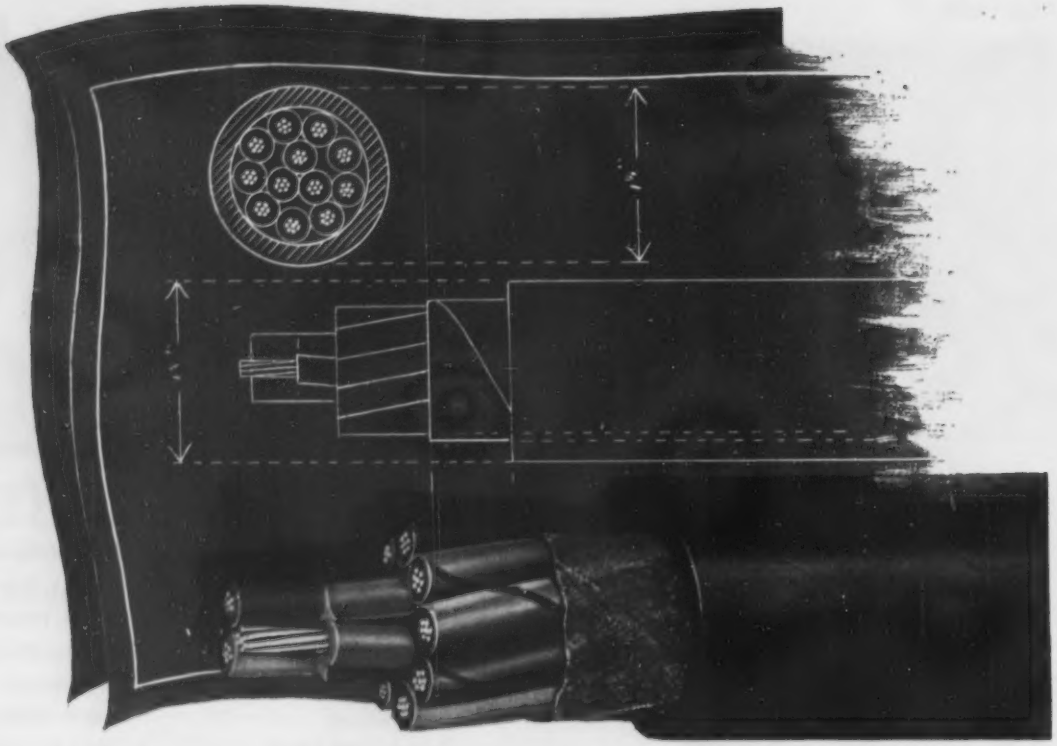

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FILLERS: Rubber, to prevent the wicking-in of moisture and to add firmness to the construction.

CONDUCTORS: Strong and flexible; tin coated to resist corrosion.

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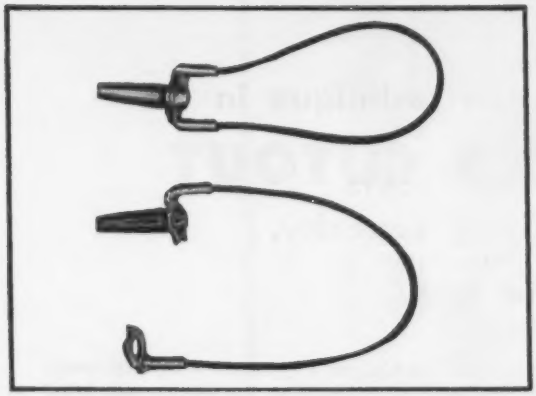
HAZARD insulated cables

1660

Electroline AUTOMATIC DEAD-END

for Neutral Supported Multiple Conductor Service-Drop Cable



THE 4000 SERIES ANCHOR BRACKET

This Electroline Automatic Dead-End is designed for use with neutral-supported type of service drop. The insulation on the phase wires is not destroyed because these Dead-Ends grip only the bare neutral. This eliminates the possibility of shorting any phase. Available only for No. 6-AWG conductor. For automatic line Dead-Ends use the Electroline 3400 Series.

THE ELECTROLINE 3800 SERIES Automatic Dead-Ends lower construction costs because they are easily installed in a few seconds. This Dead-End is assembled as a one-piece unit with no loose parts to be dropped or lost. One end of the flexible bail is detachable for use with a spool-type insulator or other types of supporting anchorages now in service. This feature permits quick and easy installation with only one part, other than the conductor, to be handled by the lineman.

ELECTROLINE 4000 ANCHOR BRACKET — The 4000 Series Service Bracket, for use on permanently multi-grounded neutral systems (ideal for use with 3800 Series Dead-Ends as illustrated below), permits quick and simple insertion of a closed bail or loop—supports the cable at any angle. Installation costs are further reduced since this method of anchoring eliminates the insulator and insulator hardware.

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At last A new cutout with HEAVY-DUTY PERFORMANCE that meets Standard Duty budgets

New circuit interruption technique in S&C's TYPE XS CUTOUT increases interrupting capacity, but not the cost.

Designed to meet the higher fault currents of today's distribution systems, the S&C Type XS is a standard-duty cutout with respect to distribution economics, but a heavy-duty cutout in its interrupting capacity. It has interrupting ratings which conform to those established by NEMA for certain heavy-duty cutouts—hence the XS may be applied wherever you need an open cutout.

An ingenious "recoil mechanism" is the heart of the Type XS Cutout. It presents a new approach to the problem of handling the energy associated with circuit interruption.

It makes heavy-duty performance possible without resorting to the methods used conventionally for increasing cutout capacities—heavier construction, larger bore, and double venting — methods which not only increase costs but usually sacrifice low fault current protection.

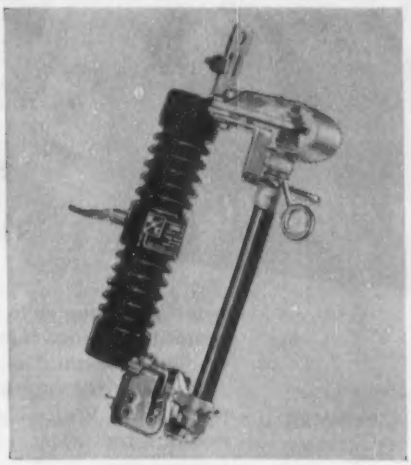
COMPARE THE CAPACITIES

The XS has an interrupting rating of 5,000 amperes (7.5 kv) and 4,000 amperes (15 kv) as compared to other standard-duty cutouts which are rated 2,000 amperes (7.5 and 15 kv).

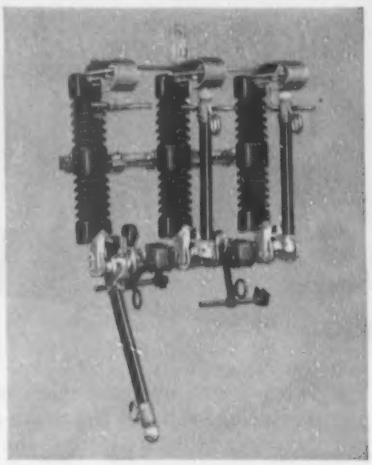
MODERN IN CONCEPT

MODERN IN DESIGN

MODERN IN APPLICATION



S&C TYPE XS CUTOUT
single-shot, birdproof



S&C TYPE XS CUTOUT
three-shot, birdproof

Complete information on the Type XS Cutout is contained in new Catalog Section 511 . . . we will gladly send you a copy.

THE TYPE XS CUTOUT

offers added advantages by eliminating:

√ the time-consuming operation of short-circuit zoning analysis to determine whether a standard-duty or a heavy-duty cutout is needed in each particular location.

√ ordering or stocking two types.

√ carrying two types of cutouts in service trucks.

√ the worry about construction crews installing the wrong cutout or tube at protection points.

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Inductronic® D-C AMPLIFIER
Measures Millivolts to 0.1%!...

The new Weston Inductronic D-C Amplifier measures both millivolts and microamperes to an accuracy previously unheard of. A product of Weston Electrical Instrument Corp., Newark, N. J.

Its resistor network uses D-H ALLOY *to assure* HIGH STABILITY and ACCURACY

The Weston Resistance Network (Actual size) is wound with D-H Manganin wire to achieve a high degree of stability with extreme accuracy.

When it's millivolts or microamperes you are measuring, you talk in terms of accuracy in the order of 0.1%. Here is the most accurate measuring instrument yet developed — the Weston Inductronic D-C Amplifier. This amazing instrument makes potential measurements down to microvolts, current measurements to fractions of a microampere.

By using this 200 kc frequency shift amplifier in connection with thermocouples, radiation receivers, bolometers, strain gages, pressure transducers, resistance thermometers, photocells, ionization gages, etc., related physical quantities can be measured with speed and accuracy far superior to any other method previously known.

The amplifying system is essentially an automatic potentiometer, wherein an output current is maintained in balance against the input through a method of accurately adjusted resistors determining the balanced ratio of output to input. With a high gain in the amplification of error unbalance, the accuracy of amplification ratio is of course dependent almost entirely upon the *stability* and *precision* of the resistor network.

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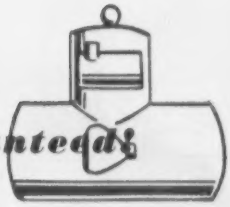

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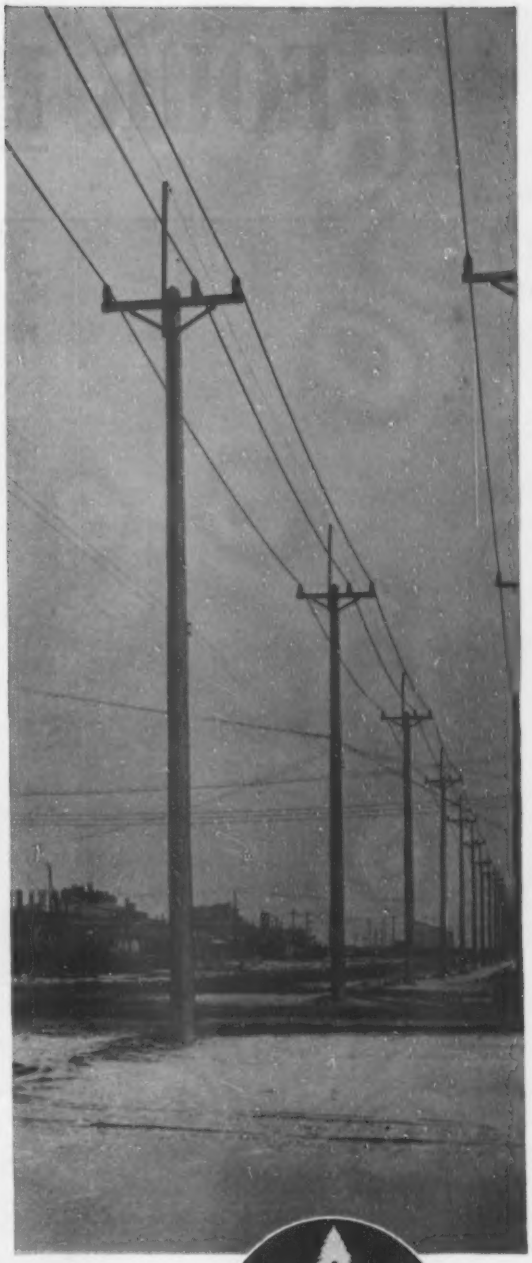

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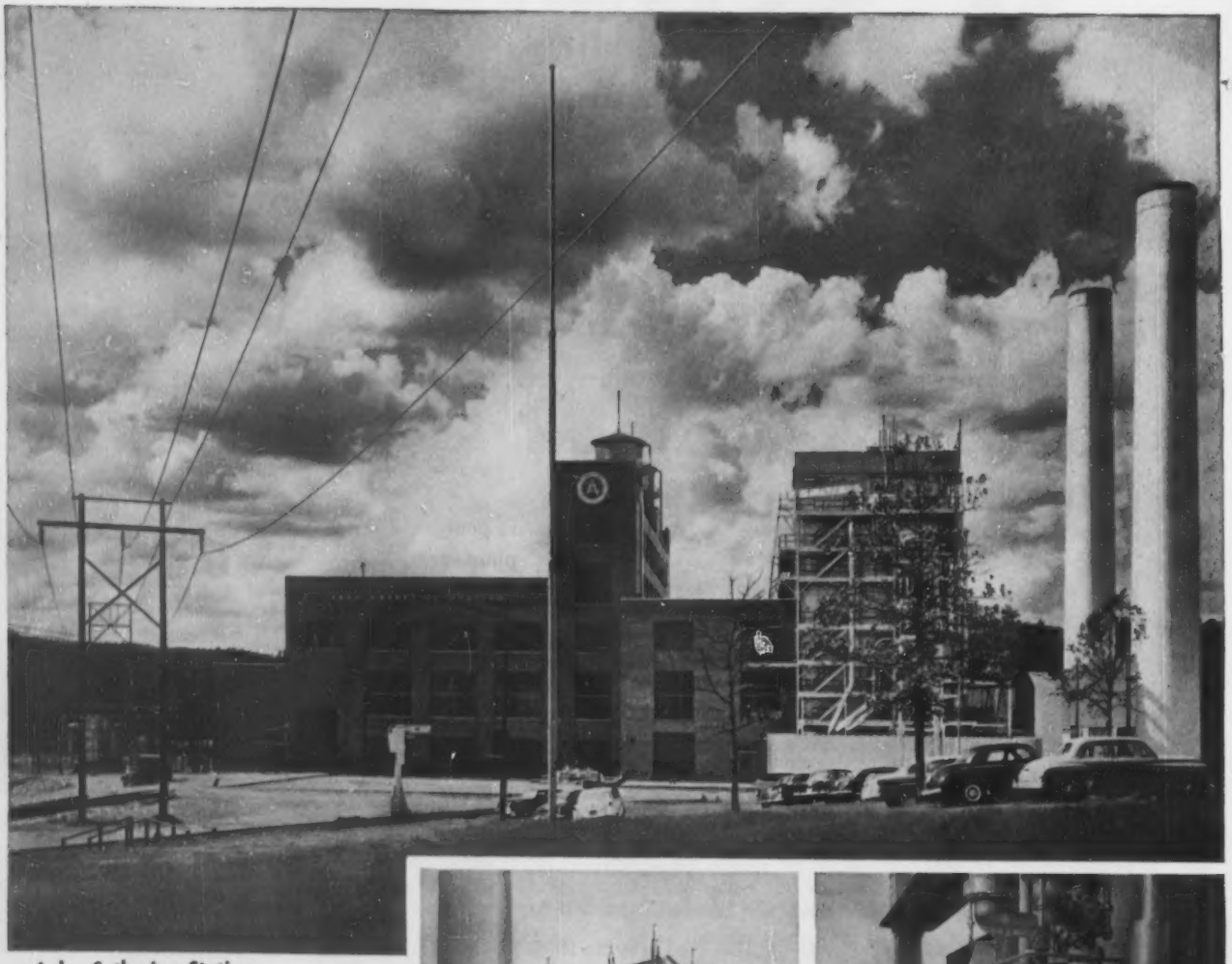
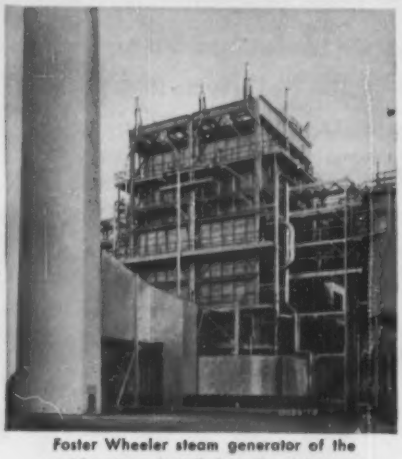
FOUR MORE OUTDOOR



Lake Catherine Station of the Arkansas Power and Light Company.

All Units
Engineered By:
EBASCO SERVICES INC.



Foster Wheeler steam generator of the outdoor-type installed at the Arkansas Power and Light Company. Typical of those installed at Louisiana Power and Light Company, and Mississippi Power and Light Company.

Section of steam drum with external weatherproof covering protruding through water-tight, air-tight steam generator casing.

STEAM GENERATORS!

Foster Wheeler outdoor-type steam generators, each of 900,000 lb per hr capacity, now serving

Lake Catherine Station.....1 unit
ARKANSAS POWER AND LIGHT COMPANY

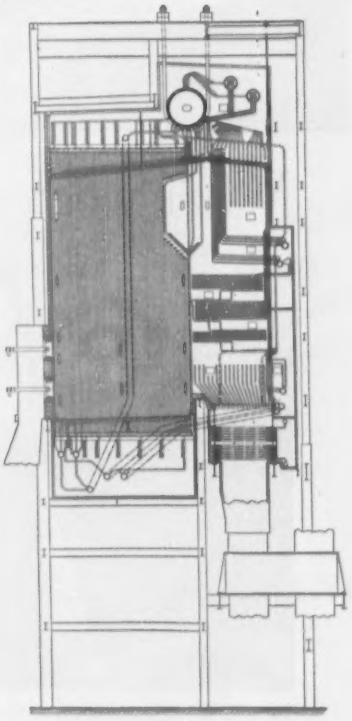
Ninemile Point Steam Electric Generating Station.....1 unit
LOUISIANA POWER & LIGHT COMPANY

Delta Steam Electric Station.....2 units
MISSISSIPPI POWER AND LIGHT COMPANY

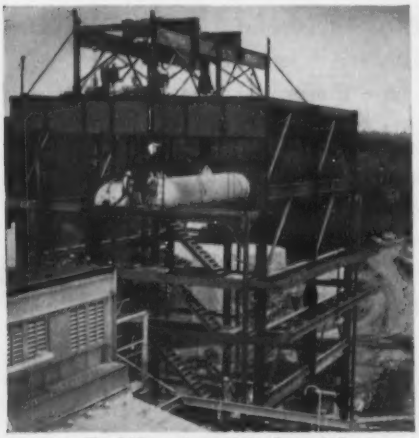
Reflecting the wide acceptance of the outdoor-type steam generator, these four Foster Wheeler units are all serving power plants in the South. Because of the traditionally mild climate in these areas, the minimum of weather protection is required for personnel, steam generating units and auxiliaries. This same basic design has proved practical and economical in the Northern States, the only difference being in the extent of weather protection provided.

Each of these new steam generators has a capacity of 900,000 lb per hr continuously, and 950,000 lb per hr for an eight hour peak. Each delivers steam at 1550 psi and 1005F at the superheater outlet. A superheat control condenser maintains steam temperature constant over an operating range from 600,000 lb to 950,000 lb per hr.

Because of the proven economy and suitability of outdoor-type construction under a wide variety of climates, Foster Wheeler units, such as these, bring a new abundance of low-cost power to help promote the industrial growth of the regions they serve.



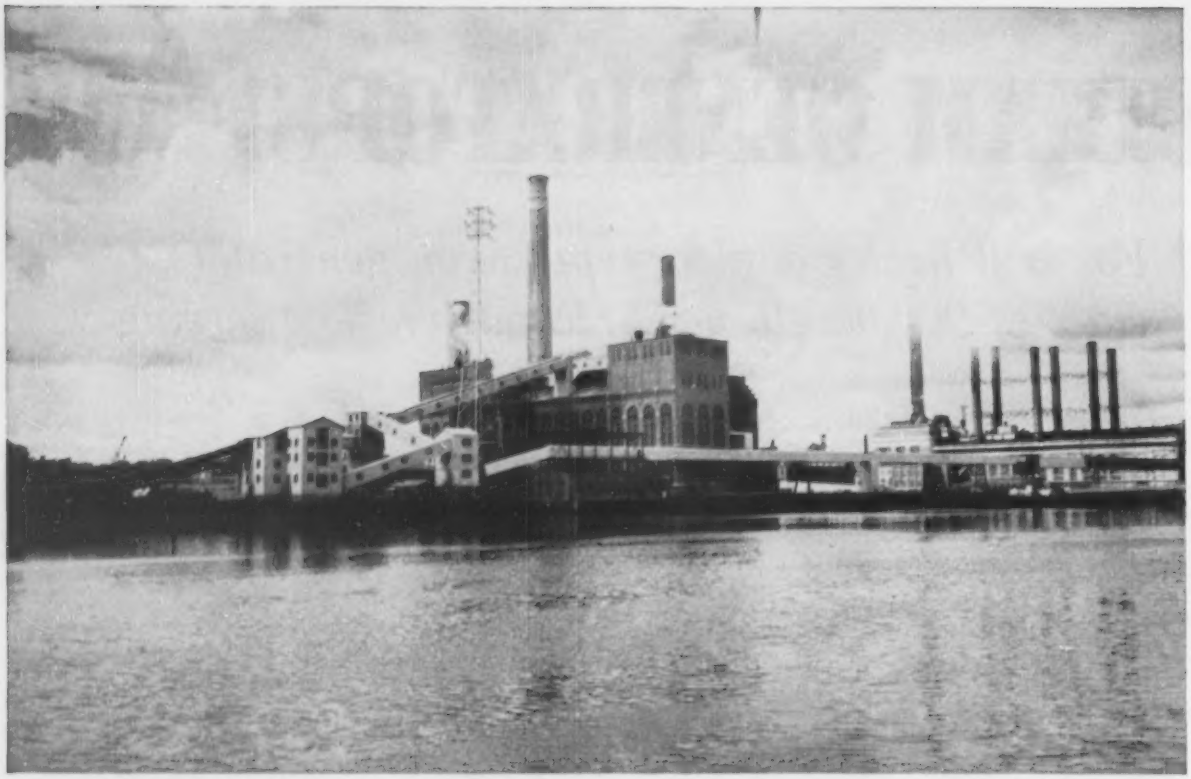
Cross-sectional elevation of the Foster Wheeler 900,000 lb per hr outdoor-type steam generator. Arrangement provides for modification of furnace for future pulverized coal firing.



The 145 ton drum of the Foster Wheeler outdoor-type steam generator being placed in position on structural steel framework at Lake Catherine Station.

FOSTER WHEELER

FOSTER WHEELER CORPORATION
165 Broadway, New York 6, N. Y.



When coal is carried to Narragansett, U. S. Rubber conveyor belts take over

This "U.S." belt carries coal at a rate of 1000 tons per hour at a speed of 615 feet per minute, to a crushing station.

When coal arrives at the docks of the Narragansett Electric Company, conveyor belts get to work and haul the coal to crushers, then to storage, and finally to the boilers which motivate the generators. Eight different belts are used, all made by United States Rubber Company. They do their job so steadily, economically and dependably that officials of the electric company have ordered additional "U.S." belting for further expansion.

"U. S." belting technicians are constantly coming up with new developments that pay off at a dollars-and-cents level for you. Familiarize yourself with the advantages of "U. S." Three-Way Engineering. Get in touch with any of the 26 "U. S." District Sales Offices, each staffed with engineers. "U. S." belting service is also obtainable from any of our selected distributors. Or write to address below.

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"Look-alikes"—in lubricating oils as in oil paintings—can fool you. But they can't fool a machine. Famous Gargoyle oils prove this point.

You can copy the physical specifications of a Gargoyle oil, but you can't copy the 88 years of experience and skill that transform these specifications into products of unsurpassed quality. Vary the ingredients or the way they're compounded even slightly, and you wind up with an oil that, at best, may do no harm. But neither can it possibly bring you the benefits the original was designed to deliver.

This *inherent quality* is only part of the Gargoyle picture. With it goes the world's greatest lubrication engineering service. We analyze your plant machinery—work with your personnel to set up a complete program of *Correct Lubrication* that will improve your production, cut maintenance costs.

Why accept substitutes for *your* plant?

SOCONY-VACUUM

SOCONY-VACUUM

Correct Lubrication

FIRST STEP IN CUTTING COSTS!

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

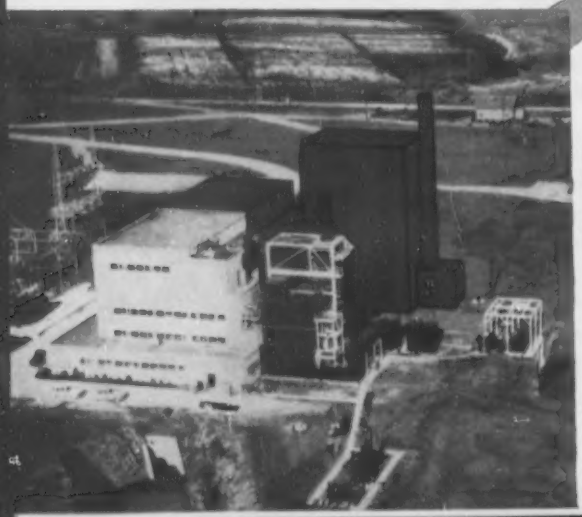
Now... reheat

In recent years, many public utility companies purchased *reheat steam generating units* for highest practical economy of power production, but most of them were designed for large turbines with rating of 75,000 kw. and more.

Central Louisiana Electric Company, Inc., after thorough consideration and study of economic factors, concluded that extra capital expenditure for reheat was warranted for new steam generating facilities at its Teche Power Station, Baldwin, Louisiana.

This small, compact 350,000 lbs./hr. Riley reheat steam generating unit will provide steam for a reheat turbine of 50,000 kw. nominal rating. The design is the result of close cooperation of engineers of Central Louisiana Electric Company, Sargent and Lundy and Riley.

small, compact 350,000 lbs./hr. RILEY reheat unit will power a 50,000 kw. turbine



If you are considering meeting relatively moderate power demands with a medium sized steam generating unit, it will possibly pay you to consider the advantages offered by this small reheat design. With the addition of Riley's exclusive single header hopper bottom this basic design can be readily adapted to pulverized coal firing.

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

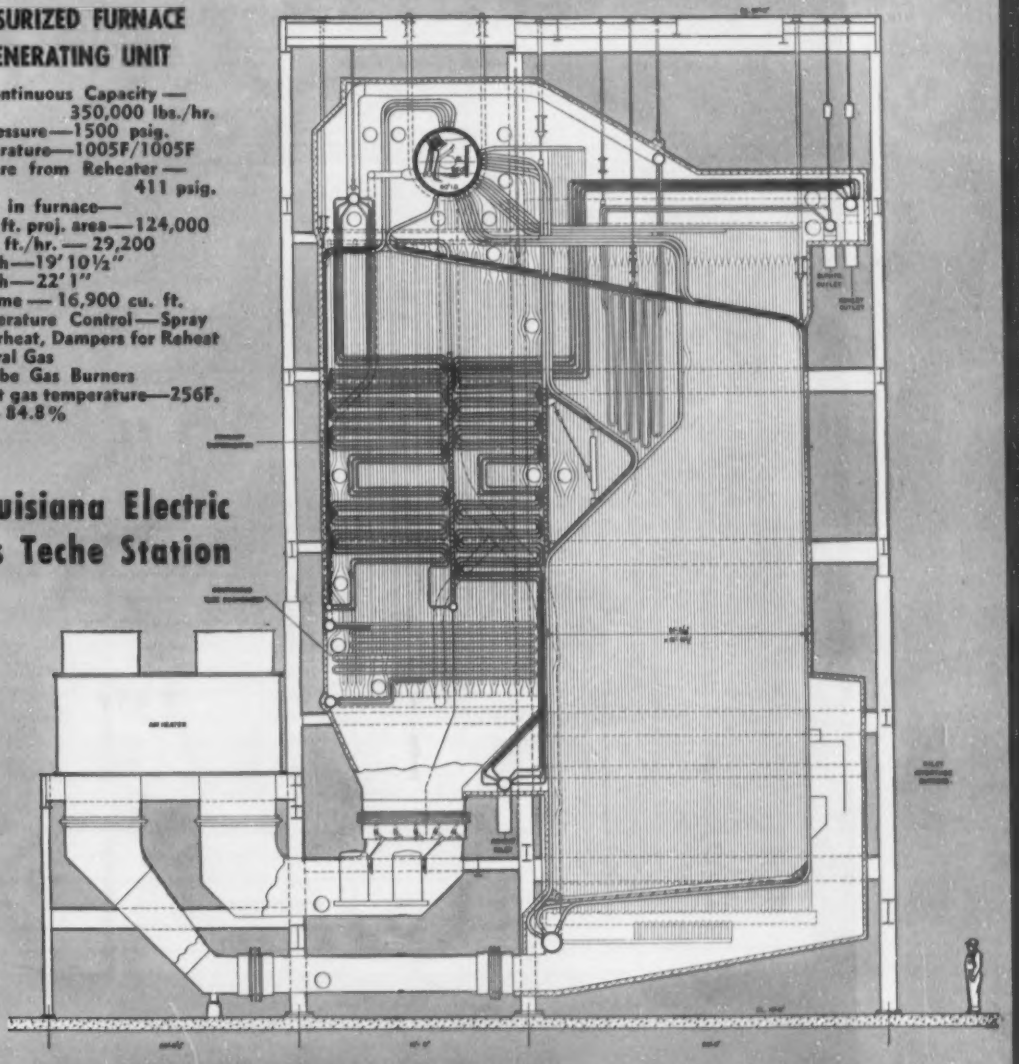
for the smaller steam turbine!

RILEY PRESSURIZED FURNACE STEAM GENERATING UNIT

Maximum Continuous Capacity — 350,000 lbs./hr.
Operating Pressure—1500 psig.
Steam Temperature—1005F/1005F
Steam Pressure from Reheater — 411 psig.
Heat Release in furnace—
btu./sq. ft. proj. area—124,000
btu./cu. ft./hr. — 29,200
Furnace width—19' 10½"
Furnace depth—22' 1"
Furnace volume — 16,900 cu. ft.
Steam Temperature Control—Spray for Superheat, Dampers for Reheat
Fuel—Natural Gas
Riley Intertube Gas Burners
Airheater exit gas temperature—256F.
Efficiency — 84.8%

at **Central Louisiana Electric Company's Teche Station**

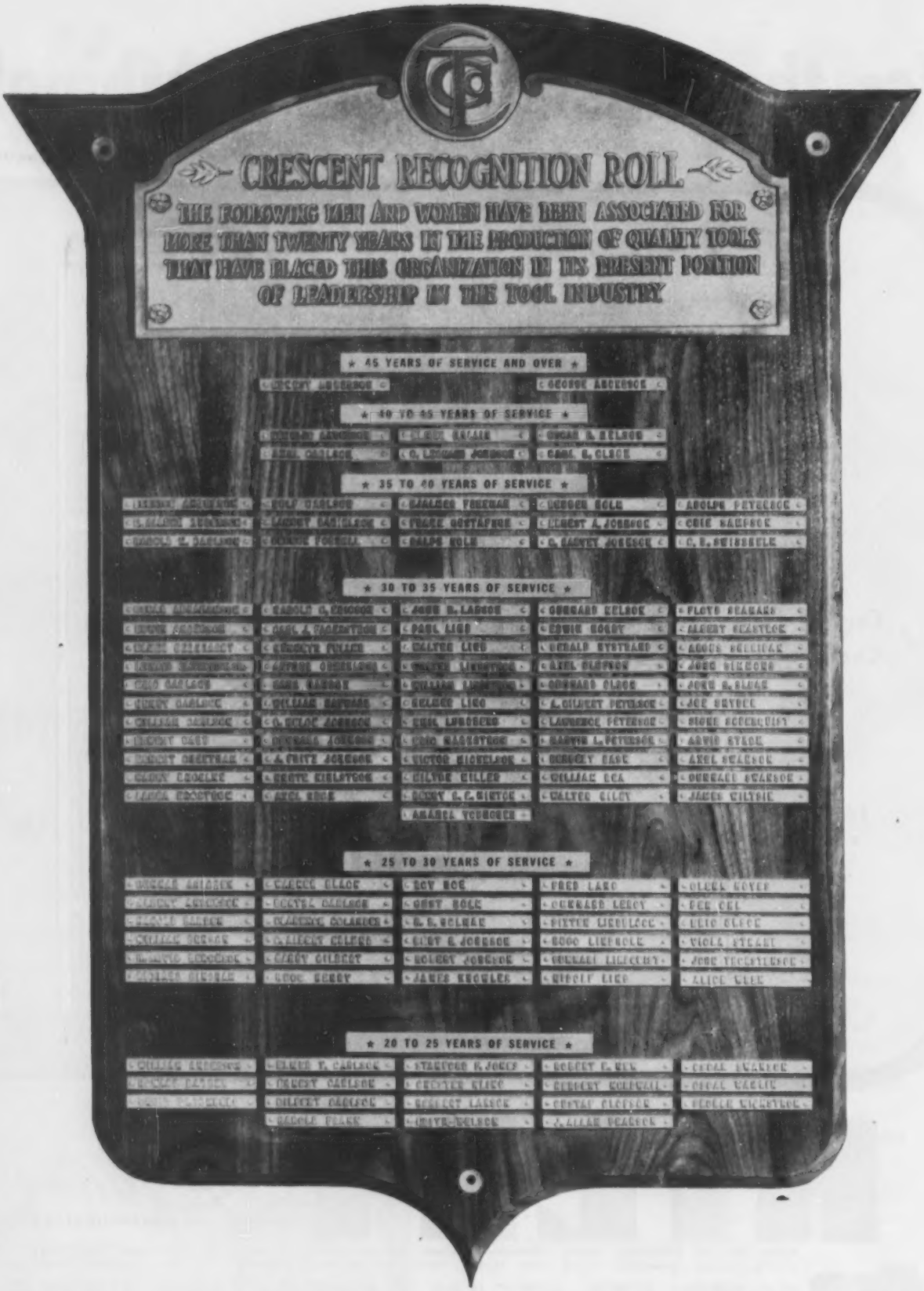
SARGENT & LUNDY, Consulting Engineers



RILEY *Stoker Corporation*
WORCESTER, MASSACHUSETTS

Boston New York Philadelphia Buffalo Washington Pittsburgh Cleveland Detroit Chicago Cincinnati Charlotte New Orleans
Atlanta St. Louis Kansas City St. Paul Tulsa Houston Denver Salt Lake City Los Angeles San Francisco Portland Seattle

COMPLETE STEAM GENERATING UNITS
AND FUEL BURNING EQUIPMENT FOR PUBLIC UTILITIES, INDUSTRIAL POWER AND HEATING PLANTS


CRESCENT RECOGNITION ROLL
THE FOLLOWING MEN AND WOMEN HAVE BEEN ASSOCIATED FOR MORE THAN TWENTY YEARS IN THE PRODUCTION OF QUALITY TOOLS THAT HAVE PLACED THIS ORGANIZATION IN ITS PRESENT POSITION OF LEADERSHIP IN THE TOOL INDUSTRY
★ 45 YEARS OF SERVICE AND OVER ★
★ 40 TO 45 YEARS OF SERVICE ★
★ 35 TO 40 YEARS OF SERVICE ★
★ 30 TO 35 YEARS OF SERVICE ★
★ 25 TO 30 YEARS OF SERVICE ★
★ 20 TO 25 YEARS OF SERVICE ★

3500 C for 30 Seconds

This Molded Current Transformer Meets Fire Test

Photo shows Type TWIA current transformer after application at 3500 C for 30 seconds. The resin extinguished itself completely. Charring occurred to depth of 7/16 inch, but beneath this depth the resin was still solid.

Allis-Chalmers thru-type molded current transformers can cause no fire hazard. Recent tests prove they will not support combustion or add to the intensity of a fire — an important thing to look for in a current transformer.

Hold More Conductors

Allis-Chalmers thru-type molded resin transformers hold more conductors than any other thru-type current transformer of corresponding rating now on the market. The oval window is large enough to hold two 500 MCM stranded conductors for any current rating in the 600-volt insulation class.

High Metering Accuracy

These transformers provide accuracy with the burden of one or more watthour meters. They are manufactured in four primary current ratings, with intermediate ratings available by passing the primary conductor through the window two or more times. Installation is simple and maintenance has been completely eliminated — no painting is required. Get complete facts from your nearby A-C office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 61B8080. A-4385

ALLIS-CHALMERS

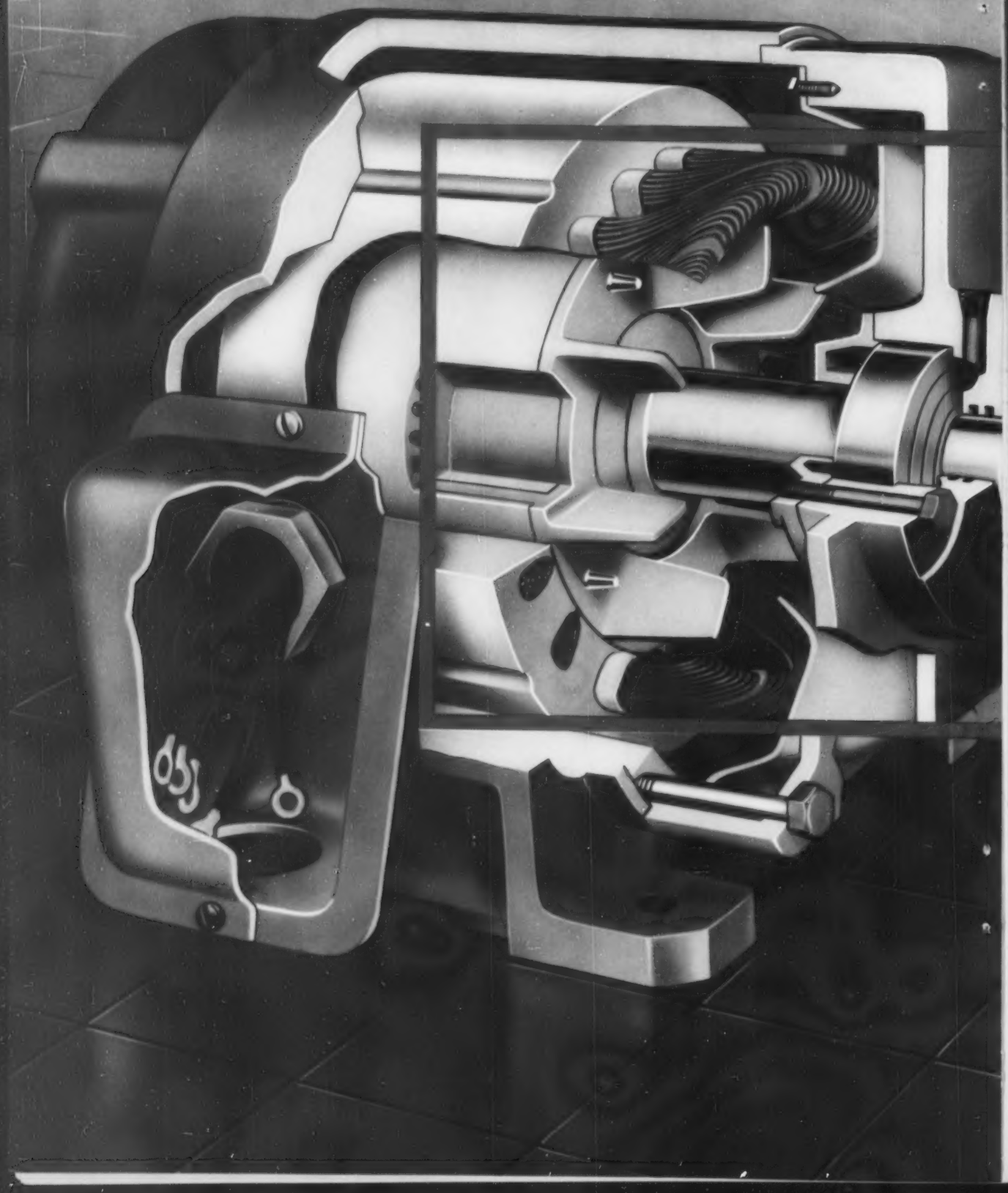
Outdoor current transformers, Type KO, rated up to 15 kv and 1800 amp.

Indoor potential transformers, Type PD, rated up to 14,400 volts, 200 va, fused or unfused.

Outdoor potential transformers, Type PWD, rated up to 15 kv, 200 va.

Over 400 Types and Ratings

Get Greater
with New Features

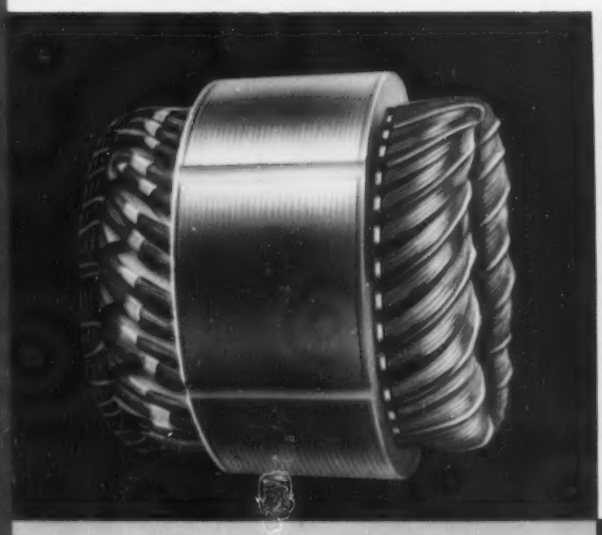


Motor Economy
. . . Proved Principles

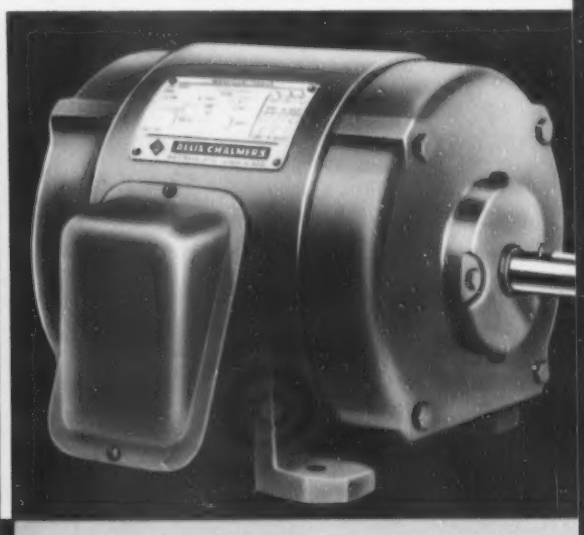
Here's the inside story of a great new motor. It combines the best of the new developments in methods and materials with the best of the tried and proved principles that have made such an outstanding record for Allis-Chalmers motors.

Smaller in size than previous designs, it offers greater protection against damage from falling liquids and solids. The bearing design gives greater bearing protection, ease of maintenance and long life. Insulation gives you famous Allis-Chalmers rugged dependability.

Consult your nearby Allis-Chalmers Authorized Distributor or District Office on your motor needs. Or write for Bulletin 51B6210.



STATOR DOUBLE INSULATED—Stator laminations are welded across back for rigidity. Heavy varnished cambric insulation is inserted between phase windings. Wound stator is dipped several times in special insulating varnish of proved effectiveness and stamina, and baked after each dip. The Allis-Chalmers stator is both physically and electrically strong . . . thoroughly protected against moisture, heat and corrosion.



RIGID CAST-IRON FRAME—Heavy, distortion-free cast-iron frame holds bearings in rigid alignment . . . gives all-around protection against physical damage . . . resists rusting.

Air intakes are well protected by being located on the underside of the end housing. There is plenty of room for free air circulation on the back of the stator core for efficient, even cooling. Air is discharged horizontally and to the sides.

Multiple bearing protection keeps grease in... keeps dirt out...permits relubrication in service

Extreme care has been taken to provide longest possible bearing life and lowest possible maintenance costs. The bearing itself is of double-shielded type, which allows controlled migration of grease in and out of the bearing to suit operating conditions. Yet bearing is protected against greatest cause of bearing trouble — overgreasing.

Close running clearances and double labyrinth seals between the shaft and outer bearing housings keep grease in the bearing and exclude dirt. Grease is kept out of the interior of the motor by a bearing cap with a long running clearance along the shaft. The cap is held tightly in place by hex head cap screws. Large grease chambers hold an ample supply of lubricant.

A-4362

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

Does your regulator meet the test?

Compare FOR YOURSELF

Thirty days of free examination: that's how Allis-Chalmers helps you decide which regulator is best for your system. Any recognized distribution system can get an Allis-Chalmers distribution regulator completely free of charge for testing. Call in your engineers, purchasing people, operating and maintenance men and let them see for themselves which regulator is best. Compare all the features.

Compare the Control, Too

For example, *Feather-Touch* controls on Allis-Chalmers regulators give you ± 1 volt band, Class I accuracy. No wonder users report revenues increasing, profits up on lines with A-C distribution regulators. Friction can never upset this control because the floating beam of the regulating relay completely eliminates mechanical bearings.

Simple Service

Feather-Touch controls also offer a good example of the simple service requirements on A-C distribution regulators. To remove and replace the control all you do is pull a single jack plug. Your linemen don't have to be technical experts because controls can be returned to a central location for checkup.

Get complete information. Better yet, get a regulator you can test for yourself. Call your nearby A-C office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for a test regulator and for the recently published "regulator check list" that will help you analyze all regulators.

A-4356

ALLIS-CHALMERS

ORIGINATORS OF 5/8% STEP REGULATION

Instant 2-way radio communication between vehicles and headquarters boosts construction efficiency in local and outlying sections

Hartford Gas Co. headquarters maintains direct 2-way radio contact with 20 vehicles—retains effective control in emergencies

Hartford Gas Company spots fieldmen in a hurry with RCA 2-Way Radio

FOR OVER TWO YEARS the Hartford Gas Company (Connecticut) has used RCA 2-Way Radio to maintain instant, positive control of 20 vehicles —10 of them service trucks, 7 supervisors' cars, and 3 street department trucks.

Serving as a combined cost-cutter, good-will builder, and life-and property-saver, the mobile communications system *has already paid for itself* in man- and equipment-hours saved, and in extra services rendered.

The Hartford Gas Company originally adopted two-way radio to boost efficiency in handling men and materials. Gangs laying mains and running services could call the dispatcher directly to get extra equipment needed. The General Foreman could answer field foremen's questions from any location. Service headquarters could use radio to have gas turned on or off, to have trouble reports investigated, to have equipment adjusted. The quick response to customers' calls built a lot of good will.

Radio plays a big part in handling emergencies, too. Headquarters radio-dispatches repair crews as soon as troubles are reported. And whenever possible, service trucks are assigned to cover all fires reported in the city . . . turn off gas connections in and around endangered areas . . . save life and property.

Since original installation, Hartford Gas Company's RCA *Carfone* equipment (152-174 mc band) has stayed on the job day and night, giving the kind of dependable performance needed. Outage time has been next to nothing. Coverage over its 100-square-mile area is complete.

Specify RCA 2-Way Radio for dependable communications in your operation. An RCA communications specialist will be glad to talk over your requirements. Free literature noted below will give you much of the information you need. *And remember,* the RCA Service Company is in a position to provide complete installation and service . . . as it did for the Hartford Gas Company.

MAIL THE COUPON BELOW—YOU INCUR NO OBLIGATION

Radio Corporation of America
Communications Equipment, Dept. C-45, Building 15-1, Camden, N. J.
Without obligation on my part . . .

☐ Please send me booklet, "How Hartford Gas Reaches Fieldmen Fast."
☐ Please have an RCA communications specialist get in touch with me.

Name_____ Title_____

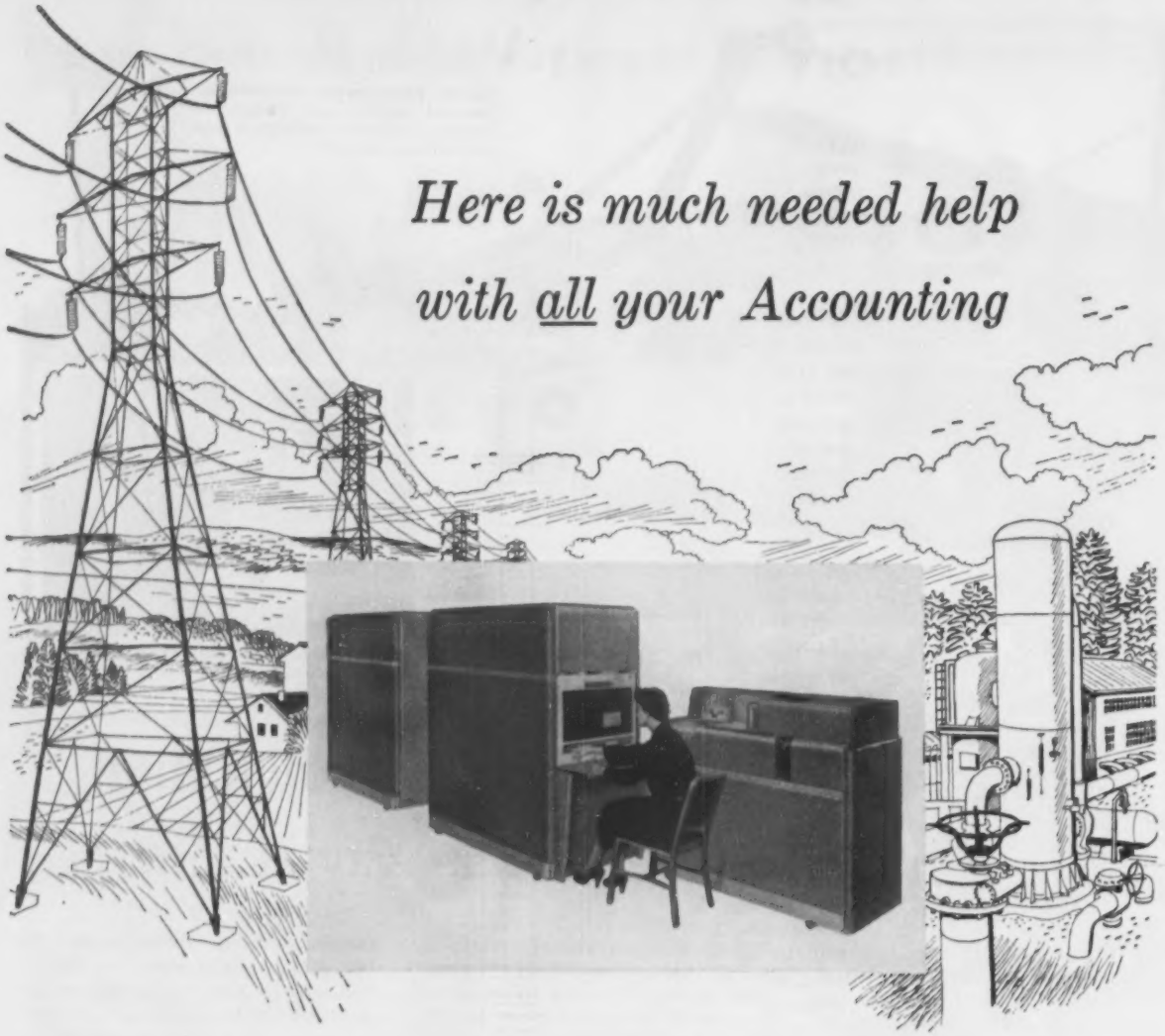
Company_____

Address_____ County_____

City_____ Zone_____ State_____

RCA **RADIO CORPORATION of AMERICA**
COMMUNICATIONS EQUIPMENT CAMDEN, N. J.

Here is much needed help with all your Accounting



IBM's new magnetic drum machine, the "650", promises really big things to utilities in *all* their accounting.

Take, for example, customer accounting. In a single operation the "650" performs all bill computation and revenue analysis. This includes an automatic high-low check, estimated bills, revenue summaries, bill frequency summaries, and accounts receivable control information. The billing cards produced in this operation may contain *aged arrears* as well as current billing data.

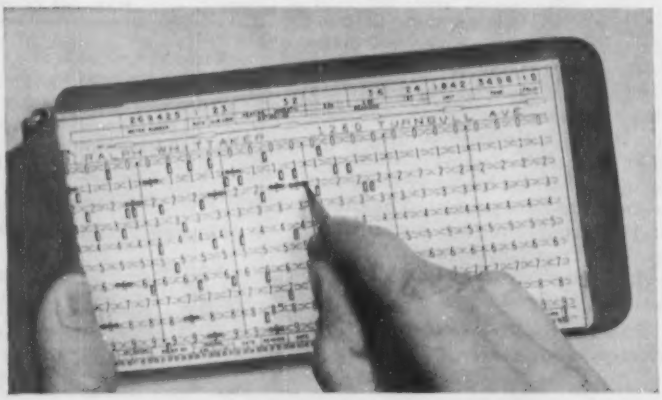
How is all this possible?

Because of its tremendous storage capacity of 20,000 digits, including as many as 2,000 program steps; its automatic table look-up, self-checking features, ability to calculate and distribute data without disturbing the original sequence of the cards, plus many other features.

If you haven't already talked about the "650" with one of our representatives, call him today for details.

IBM

INTERNATIONAL BUSINESS MACHINES
590 Madison Avenue, New York 22, N. Y.



How L-M EEI-NEMA Fuse Links Give Best Coordination With Reclosers

by **R. W. KELLY**
Application Engineer
Protective and Switching
Equipment Division
Line Material Company

The introduction of dual timing in Kyle Reclosers opened a new field in coordination, and made possible the recloser-fuse coordinated systems. For a number of years, L-M "N"-rated Unifit links have done an excellent job of coordinating with reclosers. Today, through the use of L-M EEI-NEMA fuse links, the application of recloser-fuse systems has been further broadened.

Broader Range of Coordination

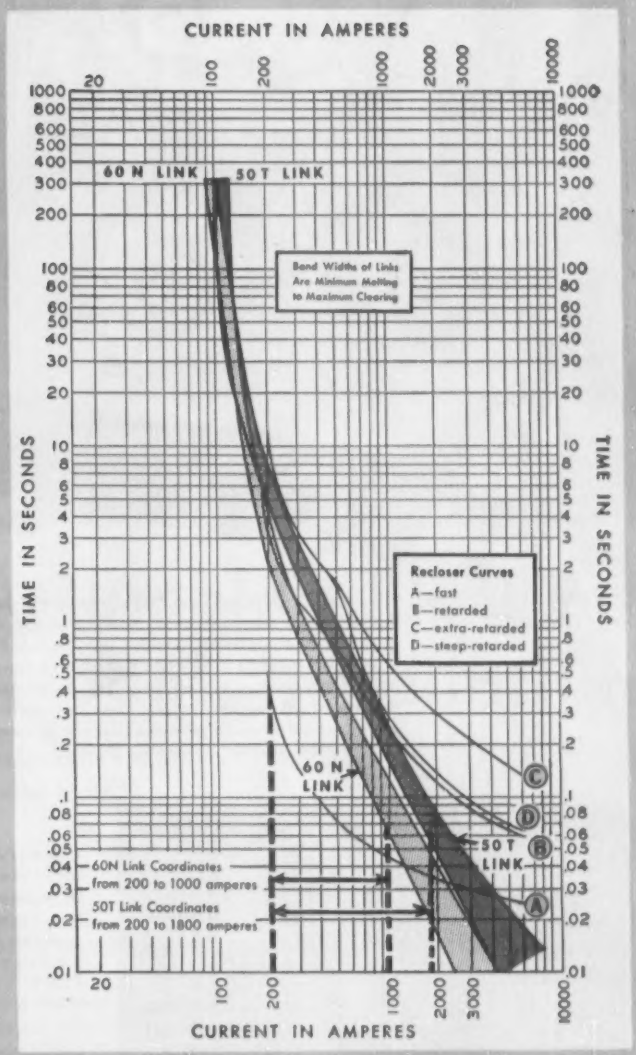
L-M EEI-NEMA links give a maximum range of coordination between reclosers and branch fuses. The improvement is illustrated by the example in the curves at the right, showing how EEI-NEMA links give even a broader range of coordination than the L-M "N" links.

Excellent coordination with reclosers is provided by both the L-M "T" and "K" EEI-NEMA links. The "T" link is particularly well suited because of its medium-slow characteristics. Yet it is not so slow that load current carrying ability is sacrificed.

L-M Links 100% Tested!

L-M EEI-NEMA links are made under close quality control. *Every* link is tested. It is subjected to a telltale resistance test, to check electrical accuracy. It is also given a 25-pound pull test to assure its mechanical strength.

L-M's CONVENIENT PACKING: L-M EEI-NEMA links come in handy 5-cell cartons. Each link is in a separate cell. Perforations make it easy to tear off one cell at a time, and to break off the end of the cell to remove the link. These cartons in turn are boxed for easy storeroom handling and distribution in 25-link packages and 100-, 150-, and 250-link cartons.



Comparison of time current curves of an L-M-Kyle type "L" 100-ampere recloser and 60N and 50T fuse links. The 60N links will coordinate in a range of from 200 amperes to 1000 amperes; the EEI-NEMA type "T" links will coordinate with the recloser from 200 to 1800 amperes.

Complete Coordination Data

L-M makes available Bulletin FC5A on EEI-NEMA links, coordination tables, interchangeability tables for replacing "N" links of various makes, and a paper on the coordination of fuse links with reclosers.

Ask the L-M Field Engineer for copies of this literature; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

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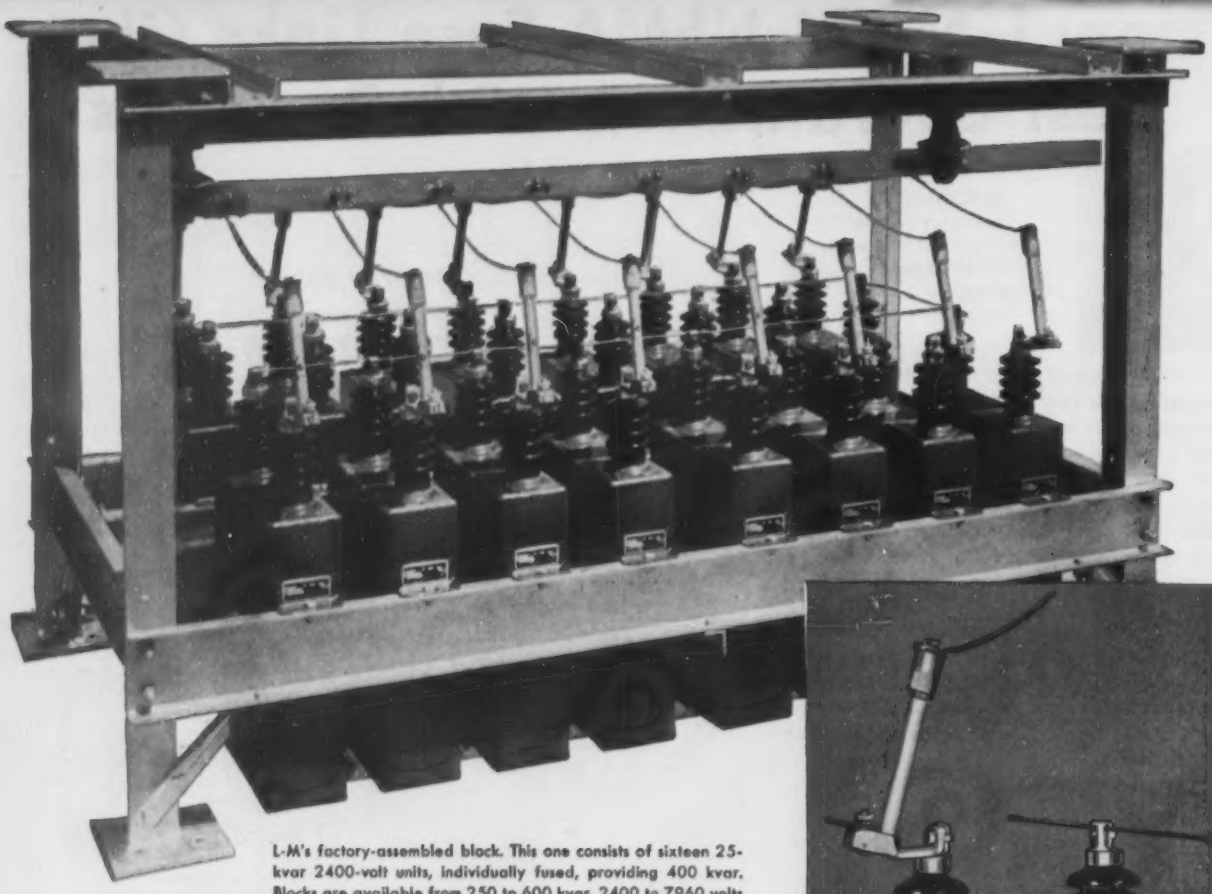
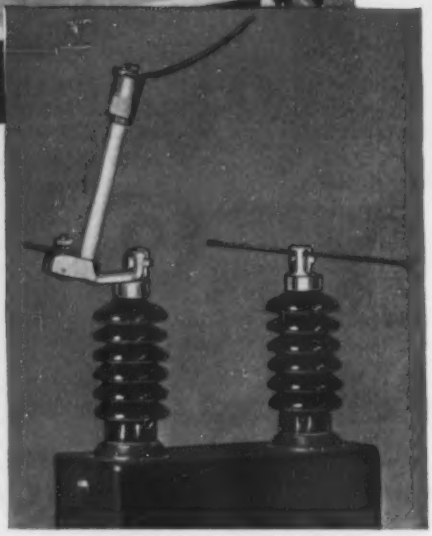
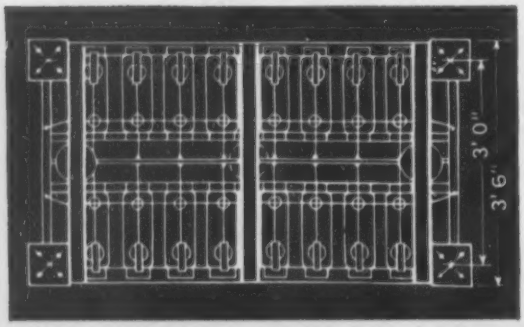
LINE MATERIAL
fuse cutouts and fuse links

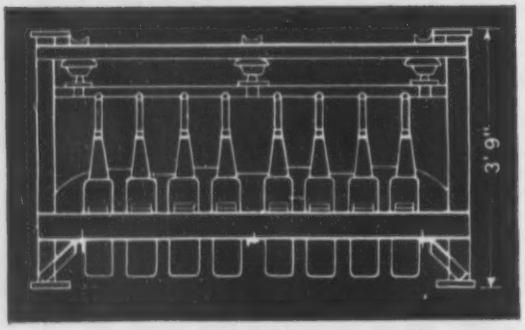


L-M's factory-assembled block. This one consists of sixteen 25-kvar 2400-volt units, individually fused, providing 400 kvar. Blocks are available from 250 to 600 kvar, 2400 to 7960 volts —all NEMA-standard sizes. Note that top and bottom plates are drilled for bolting to base support or spacing insulators or to plates of adjacent blocks. Steel frame members are hot-dip galvanized for corrosion resistance and are jig assembled to insure perfect alignment of mounting plates.



Individual expulsion fuse, mounted on the bushing of each capacitor. Uses standard distribution fuse links. These fuses isolate any capacitor that fails before the tank can rupture and damage adjacent equipment. The bank can continue operating until the failed unit is replaced.



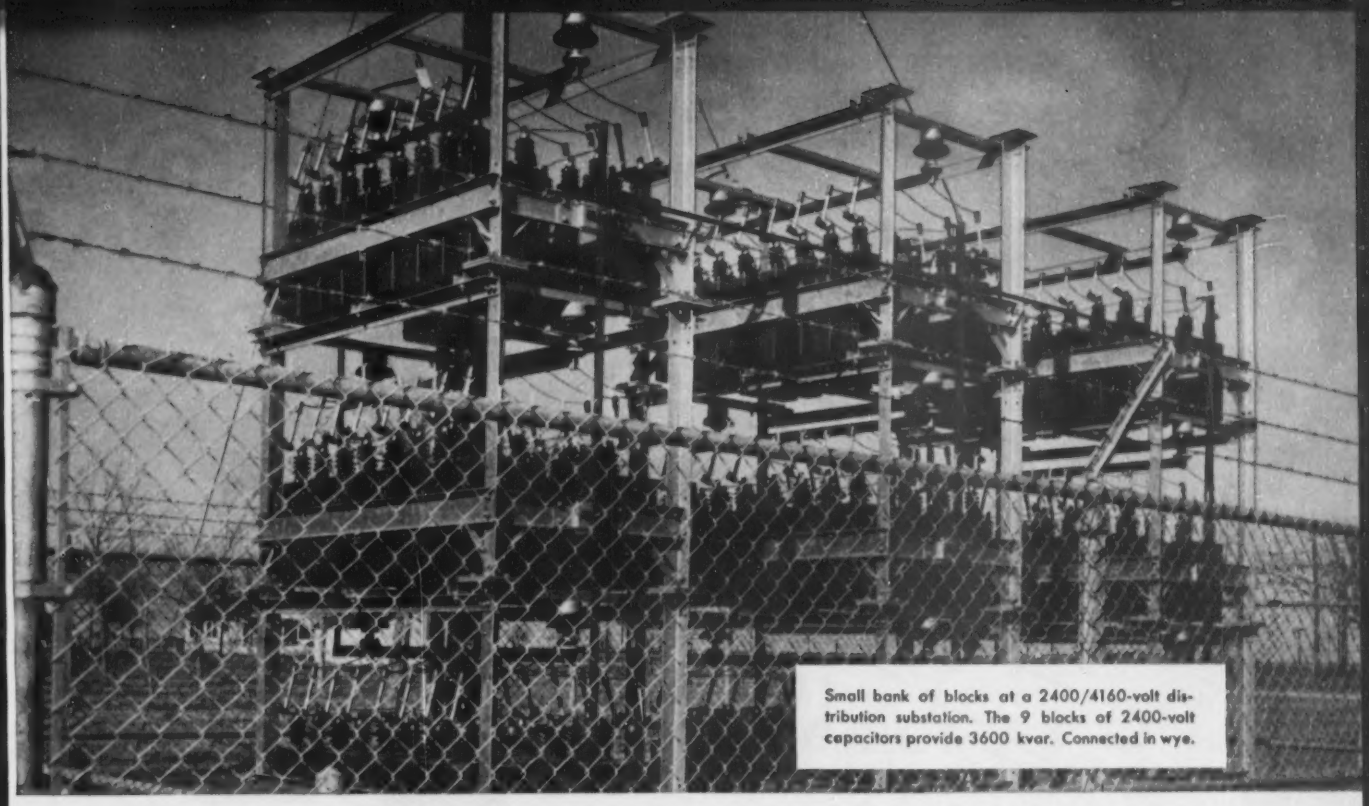


Drawings show arrangement of single-bushing Elemex capacitors in a 400-kvar 7200-volt block.

L-M Factory-Assembled Blocks Are Available in All NEMA-Standard Sizes

Voltage	KVAR	Number of Individual Capacitors Per Block	Rack Dimensions Center to Center of Mounting Plates Length	Width	Height
All sizes available from 2400 to 7960 volts	250	10	3'9½"	All	All
	300	12	4'5"	3'0"	3'9"
	350	14	5'½"	(total outside width 3'6")	
	400	16	5'8"		
	450	18	6'3½"		
	500	20	6'11"		
	550	22	7'6½"		
	600	24	8'2"		

Mounting Plates
4 ¼"-dia. holes on 5" B.C. in top and bottom plates



Small bank of blocks at a 2400/4160-volt distribution substation. The 9 blocks of 2400-volt capacitors provide 3600 kvar. Connected in wye.

L-M Factory-Assembled Blocks Speed Capacitor Bank Installation

Factory-assembled, wired and fused blocks cut erection costs and time on large or small transmission or distribution capacitor banks.

By **N. K. DELANEY**
Manager of Capacitor Sales
Line Material Company

With the growing trend toward the application of capacitors to transmission lines, the cost of installation becomes a matter of growing concern. Large series-multiple banks can involve hundreds of individual capacitors. Wiring such units and the individual fuses takes many scarce man-hours.

L-M factory-assembled blocks cost only slightly more than the individual, unwired components. They not only cut installation time about one-half, but also save countless hours of engineering and installation supervision.

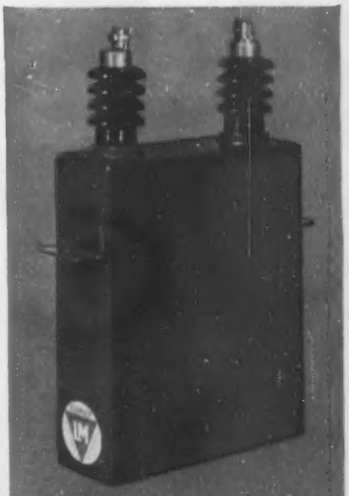
These blocks are built up in stacks, with or without spacing insulators as needed. The only wiring needed is the connections to each block, to obtain any desired series or parallel combination. The blocks themselves provide the steel needed for the capacitor structure. The great saving is obvious.

Another advantage of these L-M blocks is that they are easily moved and reinstalled at another location if conditions should make a change desirable. The rigid frame and sturdy construction make portability practical and safe.

L-M factory-assembled blocks are available with from ten to twenty-four 25-kvar capacitors, giving from 250 to 600 kvar per block, for voltages from 2400 to 7960. For higher voltages the blocks are connected in series. When transmission voltage banks are to be step switched, L-M's exclusive Voltage Divider Switching Method (patent applied for) provides an economical, efficient method for automatic switching.

Check The Costs—See What You Save

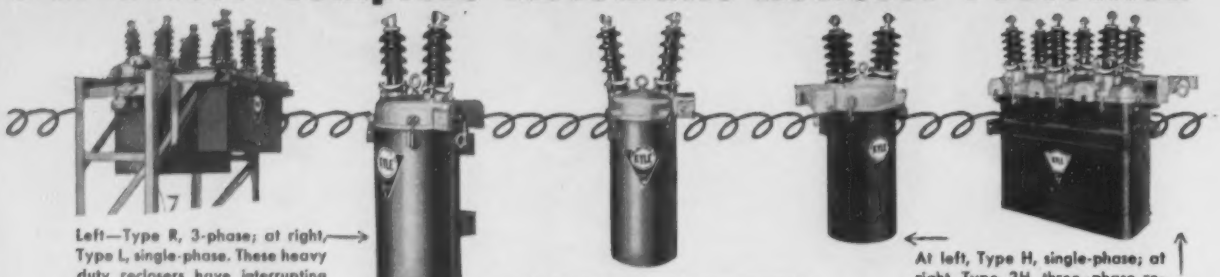
Ask the L-M Field Engineer to give you comparative costs of individual components and L-M blocks. You can readily arrive at the possible savings in time and manpower. Or write Line Material Company, Capacitor Sales, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



L-M's ELEMEX® Capacitors offer many desirable features—strong, solder-sealed bushings with "Parn-groove" connectors; uniform terminal height above flanges in each voltage class; exclusive continuous-vacuum impregnation process assuring exceptionally low failure rate. Available with regular or low-temperature Elemex dielectric.

LINE MATERIAL Elemex® Capacitors

L-M Offers Complete Automatic Recloser Protection

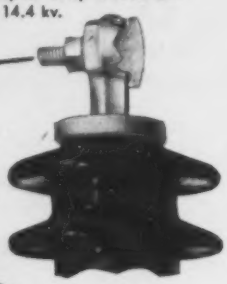


Left—Type R, 3-phase; at right, Type L, single-phase. These heavy duty reclosers have interrupting capacities of 6000 amperes at 4.8 kv, 4000 at 14.4 kv.

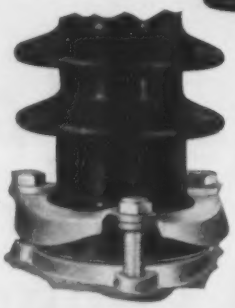
Type E—intermediate duty single-phase recloser interrupts up to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv.

At left, Type H, single-phase; at right, Type 3H, three-phase recloser. These units provide interrupting capacities up to 1250 amperes at 14.4 kv.

With the units shown in the illustrations above, Line Material provides complete, coordinated automatic protection from substation to load—for single-phase and three-phase lines. This complete protection helps maintain service continuity, and cuts service calls by eliminating fuse blowing by temporary faults.

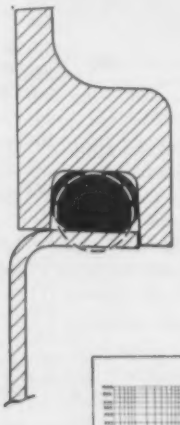


Plated universal terminals for copper or aluminum, No. 8 to 2/0. No loose parts to fall off.

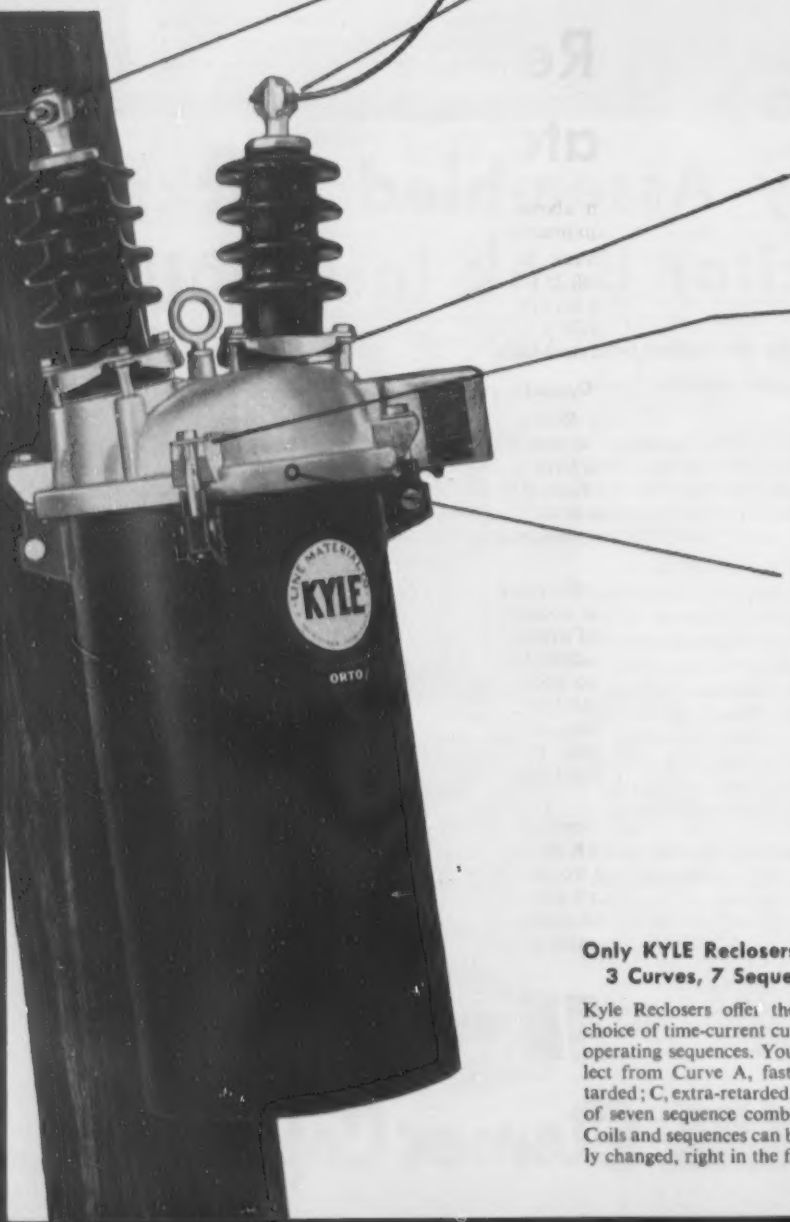


Clamp-on bushings, easy to replace in case of accident.

Head may be rotated to desired position.

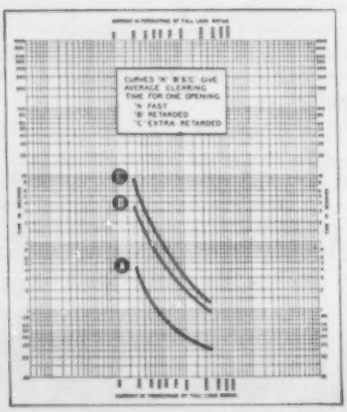


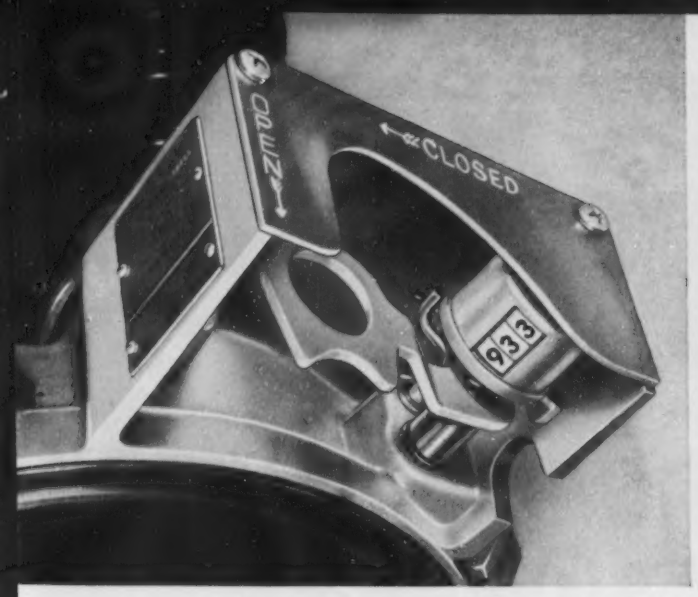
Soft O-ring type Buna-N oil-proof rubber gasket completely contained and held under proper pressure against tank rim by deep groove.



Only KYLE Reclosers Offer 3 Curves, 7 Sequences

Kyle Reclosers offer the widest choice of time-current curves and operating sequences. You can select from Curve A, fast; B, retarded; C, extra-retarded. Choice of seven sequence combinations. Coils and sequences can be quickly changed, right in the field.





The sleet hood is large, well proportioned. The counter has been improved. It has larger figures that are easier to read.

Optional non-reclosing device. With lever down, recloser opens once, does not reclose, for greater safety in hot-line work.

L-M's Kyle® Type H Reclosers Offer New Features For Greater Convenience

by **R. C. KIRK,**
Manager,
Kyle Products Sales,
Line Material Company

Perhaps one of the reasons for the wide leadership of Kyle Reclosers is the close attention we have always given to product performance *and* convenience for the operating man. In line with this policy, further improvements have been made in the Kyle Type H, the world's largest-selling oil circuit recloser.

New clamp type bushings are now being used. These make bushing replacement easy in case of accident. Universal terminals are plated for use with both copper and aluminum.

Tank cover clamping and gasketing have been improved to take full advantage of latest gasketing materials. The head is larger, smoothly contoured, with a large lifting eye. Gasket is now a soft O-ring of oil-proof Buna-N rubber, contained in a deep groove which keeps the gasket under controlled compression against the tank rim. Lips on the groove keep the gasket from falling out when head is raised.

The tank itself is slightly larger. Oil capacity has been increased to 4¼ gallons. This, plus the use of ORTO®, L-M's inhibited transformer oil, is extra oil-life insurance.

Sleet hood is larger. Figures on the counter are larger and more legible. The non-reclosing device, shown above, is now available as optional equipment.

Interrupting ratings have been rounded off so that they are all 25 times the coil size. This represents no appreciable change, as there is still a very large margin of safety in Kyle design.

Advantages of Recloser Operation

The use of Kyle Automatic Reclosers helps maintain continuity of service, because the recloser eliminates a large majority of the faults that blow fuses. This cuts service trips, and eliminates the risk of upsetting coordination by installing the wrong size fuse.

Kyle Reclosers themselves offer many advantages. Their operation is accurate and dependable, in all kinds of weather. Kyles provide positive toggle action, fast opening and closing. They do not depend on gravity, motors, or clockwork. Kyles offer a wide choice of time-current curves and operating sequences. Coils and sequences are easily changed, right in the field!

The Kyle hydraulic mechanism is simple, troublefree. Thousands of Kyles are in regular operation from the tropics to Alaska. More than 100,000 Kyle Type H Reclosers prove the value and dependability of the Kyle operating principles.

Ratings of Kyle Type H Reclosers

Coil Rating, Amperes	Minimum Tripping Current, Amperes	Interrupting Ratings,* Amperes, 14.4 kv
5	10	125
10	20	250
15	30	375
25	50	625
35	70	875
50	100	1250

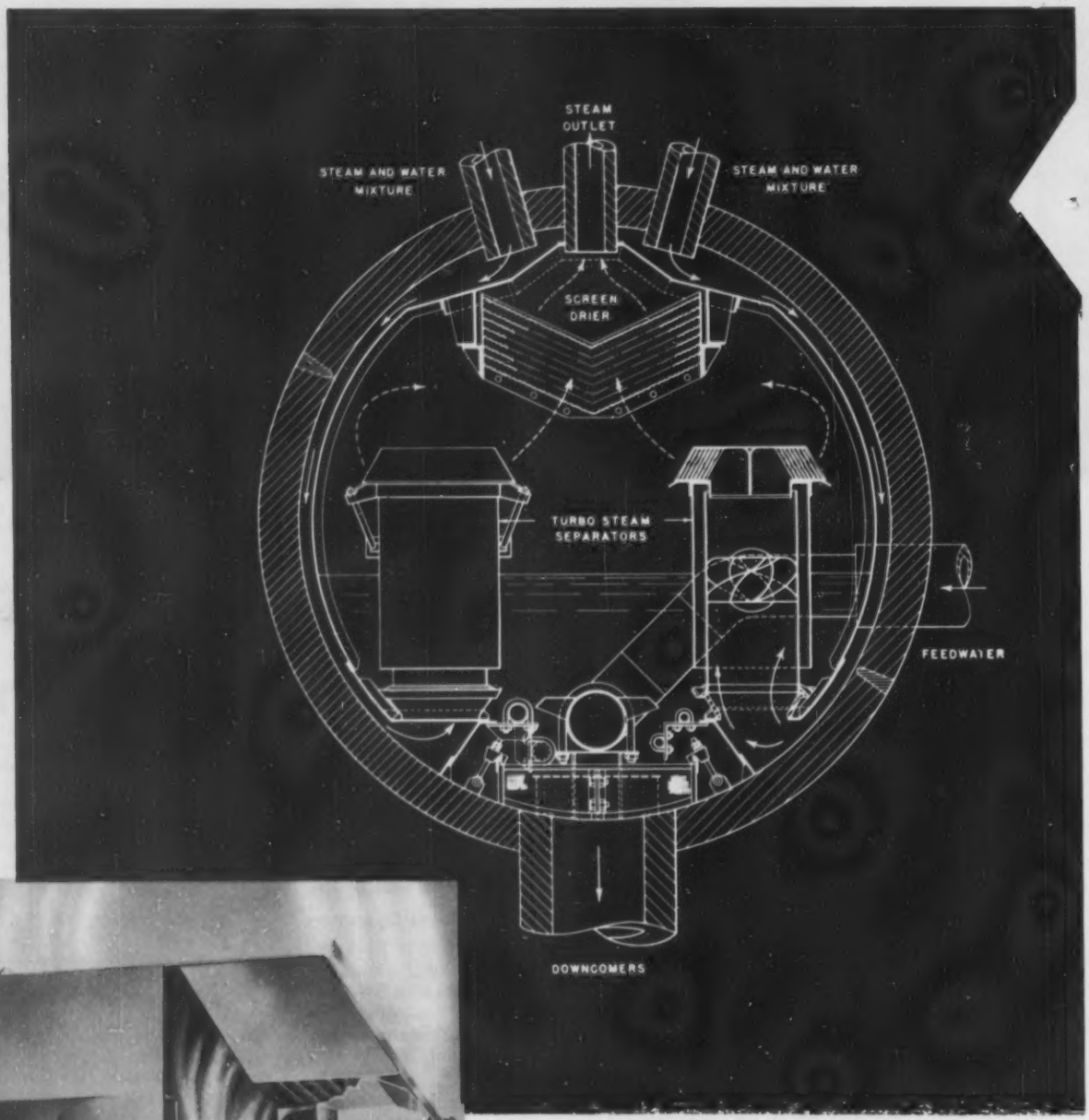
*Symmetrical RMS Amperes at maximum phase to phase nominal voltage of 14.4 kv. Interrupting ratings are based on a maximum test circuit X/R ratio of not less than 8 and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

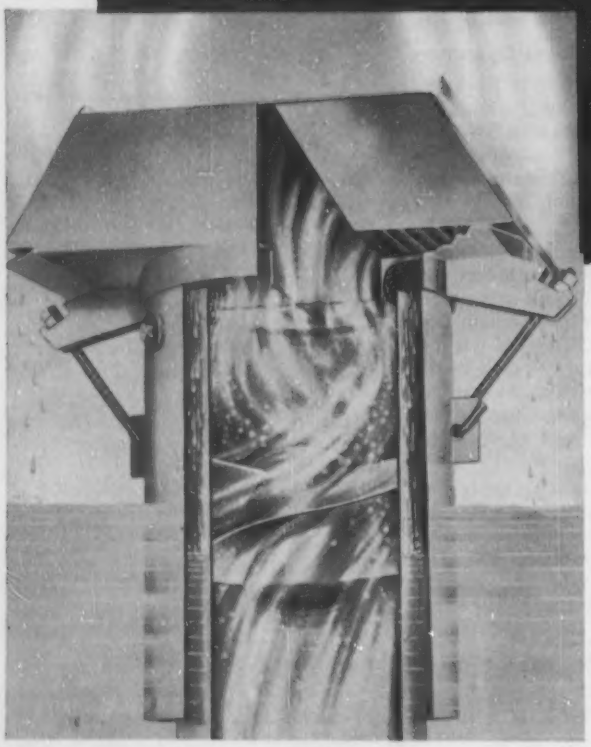
Get Information on Complete Coordinated Automatic Protection

L-M offers a complete line of reclosers and sectionalizers to provide complete, coordinated protection—single- and three-phase—from substation to load.

Ask the L-M Field Engineer for information and bulletins on Kyle apparatus—or write Mr. Kirk at Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division). 161

LINE MATERIAL
Kyle® Reclosers





How it works

Steam-water mixture enters the top of the drum through nozzles discharging into an annular space formed by internal baffles. Flow of the mixture is directed downward behind symmetrical baffles around the entire drum surface, maintaining a uniform drum-wall temperature, and then into the Turbo-Separators. The latter contain a center core and vanes which give the mixture a spinning or centrifugal motion, thereby throwing the water to the outer edges of the inner tube. Directly above the directional vanes and cores there is a skim-off lip which directs the water over the top of the inner tube and thence through the annular space to the drum. This is the primary separation stage. The relatively dry steam then passes through two opposed banks of closely spaced corrugated plates, which change the direction of the steam many times and throw out much of the remaining water. This is the secondary separation stage. The third and final stage of purification is accomplished in the screen dryer.

MEET THE TURBO–SEPARATOR

. . . the best friend a turbine ever had

To anyone concerned with the subject of steam purity and quality, boiler drum internals are of great significance. For that reason, we would like to have you meet the C-E Turbo-Separator, long an integral part of C-E Utility Boilers, but normally well concealed from view within the dark recesses of the steam drum.

The true test of any system of drum internals lies in what it can do with the combination of water, steam and solids it must handle — not alone under steady base load conditions — but under all operating conditions. Sudden load fluctuations, change in boiler water level and increased solids concentration in boiler water due to condenser leakage are three common occurrences that can greatly affect the relationship of solids to steam.

Whether the concentration of solids in boiler water averages less than 100 ppm or even more than 1000 ppm — or whether it fluctuates anywhere between — the C-E Turbo-Separator *maintains* steam purity and quality well within satisfactory limits.

To be more specific — test results in a number of cases have shown less than .5 ppm and in some instances as low as .1 ppm. These results are supported by the fact that in no plant where Turbo-Separators are installed has there been any measurable loss of turbine capacity due to deposits on turbine blades.

When you add the proven advantages of C-E Turbo-Separators to the operating characteristics of modern designs of C-E Utility Boilers, you have the right combination for top year-around plant performance on all counts — efficiency, capacity and continuity of service.

8-758

COMBUSTION ENGINEERING

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BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS, AUTOMATIC WATER HEATERS; SOIL PIPE

Here's why **CRYSTAL VALVE** ARRESTERS give positive protection

ULTRA-SPEED GAP FOR FASTEST PROTECTION
VENT OPENINGS ELIMINATE CORROSION DUE TO MOISTURE
CRYSTALLITE GIVES MULTI-PATH DISTRIBUTION OF SURGE

INSPECTING CRYSTALLITE. Every batch of oxidized silicon carbide grain (used as valve element of CRYSTAL VALVE Arresters) is checked for grit size, coating and electrical performance.

It's how they're made that gives you peak performance

CRYSTAL VALVE Ventilated Gap Lightning Arresters are built to protect power lines and transformers indefinitely. Only three known failures in 500,000 lightning arrester years mar their perfect record. Three factors account for this *positive* lightning protection:

- PERFECT VALVE ACTION—Crystallite (oxidized silicon carbide grain) is *packed*—not bonded—to provide a multi-path valve element. This insures quick, uniform distribution of surge discharge, fast suppression of follow current. No other valve surpasses the performance and long life of CV Arresters.
- ULTRA-SPEED GAP—Multiple-gap arcing unit is service-engineered to be the fastest gap in the industry. Large, smooth arcing surfaces, extremely accurate dimensions of gap and components give super speed and super safety.
- SURE GAP VENTILATION—Vent openings expel conductive ionized gases, bring in fresh air for high resistance to circuit current. Assures dry, clean interior . . . freedom from gap corrosion.

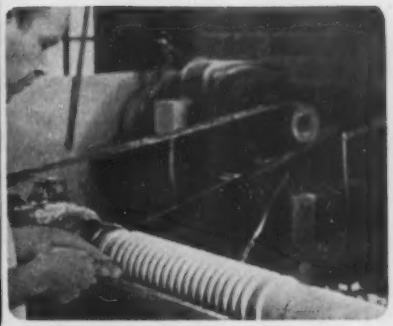
For long life under every known condition, you need the positive protection of CRYSTAL VALVE Ventilated Gap Lightning Arresters.

WRITE TODAY, LISTING YOUR SERVICE REQUIREMENTS, AND ASK FOR COMPLETE ENGINEERING AND INSTALLATION DATA

CRYSTAL VALVE
LIGHTNING ARRESTERS

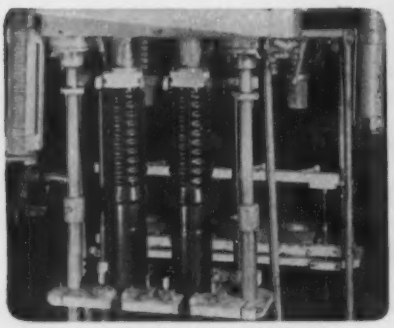
Ventilated Gap you the you need

Steps in Making CRYSTAL VALVE ARRESTERS

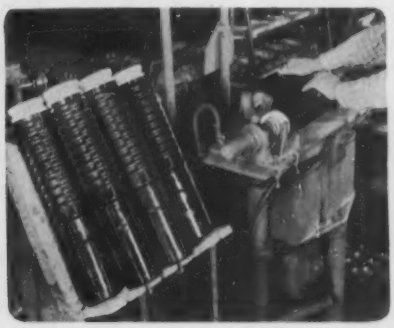


1. High-strength Porcelain Body is formed on lathe before firing in kiln. Wet-process porcelain for electrical use provides dense, sturdy housing of high dielectric and thermal strengths.

2. Moisture-proofing Arrester bodies as they revolve, up-ended, on "merry-go-round." Molten compound is poured onto gasketed ground contact plate, around main ground stud member.



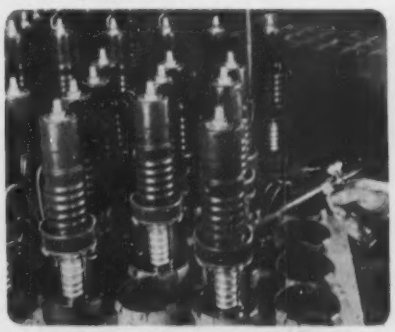
3. Precision Filling Machine automatically measures Crystallite grains into Arrester body. Line contact plate and gasket retainer plate are placed on top of valve element.



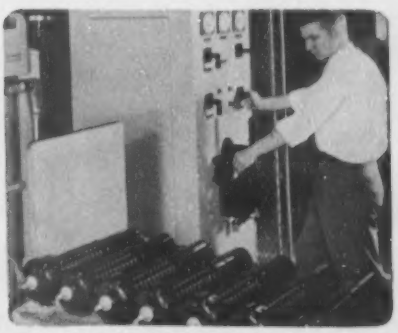
4. Uniformly Settling Grains of valve element assures uniform surge current distribution. Rocking, rotating and pneumatic packing of grains are followed by hermetically sealing.

5. Ultra-speed Arcing Units are assembled: electrodes, steatite ceramic rod and spacers, terminal "hardware." Spark-gap assembly is inspected, installed in Arrester over retainer.

6. Sure-fit Copper Cap Crimped over Arrester body by hydraulic pressure. (Porcelain-glass Arresters receive glass housing at this point.) Base "hardware" is assembled, fastened.



7. Weather-proof Sealing Cap and glass housing. Non-siphoning line lead is attached, porcelain top cap installed. Sealing compound is poured into cap and housing skirt, "torched off."



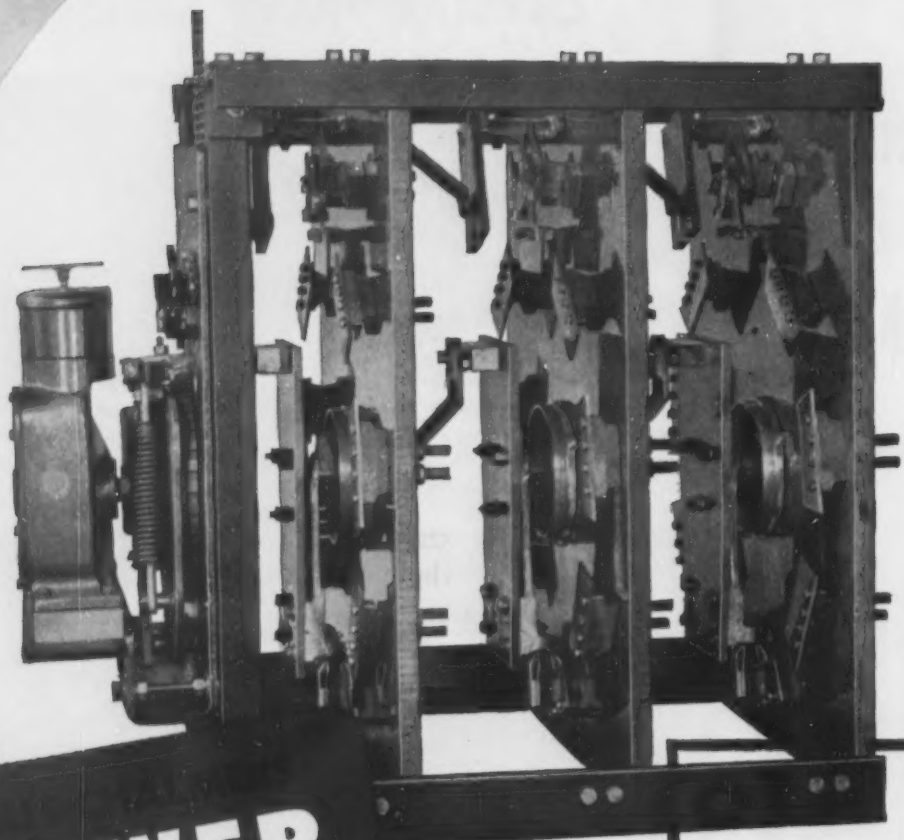
8. 100% Pre-Tests at 60 Cycles impose higher-than-rating voltages. Dynamic Test simulates lightning stroke; Arc-over Test tells at what voltage Arrester "opens" to lightning surge.

Electric Service Manufacturing Co.

PHILADELPHIA 32, PENNSYLVANIA

Represented in Canada by Lyman Tube and Bearings, Ltd., Montreal and Toronto

20 Years'



POWER

Simple, Rugged Design

Quick-Break tap-changing mechanism gives long contact life. Here's why: taps are changed with such speed and effectiveness that contact deterioration is negligible. Maintenance requirements are reduced by the highly efficient, simple design. All moving parts operate under oil — even the driving motor. There is nothing to lubricate or adjust. Self-aligning couplings between operating mechanism and dial switches eliminate any danger of misalignment. Every nut and bolt is securely locked in place.

Field Proof-

Here's the Tap-Changing-Under-Load Mechanism That Has Given 20 Years of Unequalled Performance

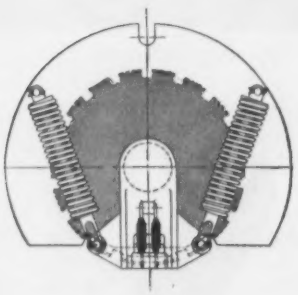
Field-proved — and unsurpassed in twenty years — that's the story behind Allis-Chalmers famous *Quick-Break* tap-changing mechanism. No other tap changer on the market gives you its combination of ruggedness, accuracy, and simplicity — features that add up to practically trouble-free operation.

Laboratory-proved — tests show that the *Quick-Break* mechanism will withstand 5 million operations — equivalent to over one hundred years of normal service. The *Quick-Break* mechanism was designed to operate under the most difficult conditions. After twenty years of field operation, it is still the simplest, most efficient means of changing taps under load.

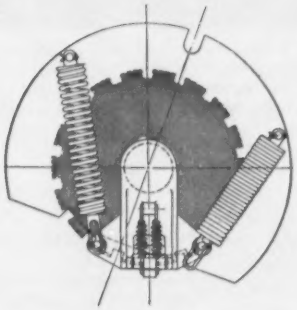
Get More Facts. If you don't have all the facts already, it will pay you to get more details by contacting your nearby Allis-Chalmers office or writing Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4193

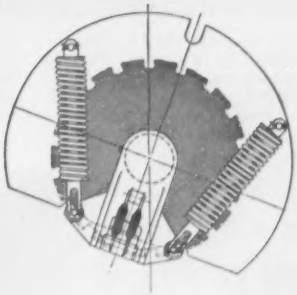
How It Works



1 Dial switch operates on the balanced spring principle. Components include outer moving segment, inner stationary index plate, and powerful springs for fast drive snubbing action.



2 Start: driving motor rotates outer segment but latch on crank arm holds tap switch in position. Heavy-duty springs store energy to produce quick start and stop of switch.



3 Finish: cam on segment lifts latch. Released spring tension rotates switch swiftly to next operating position. Latch locks switch and places mechanism in position for next change.

ALLIS-CHALMERS

The neatness of Rome thermoplastic control cables permits compact installations. They may be installed in ducts, trays or on racks or combined in circuits using all three. Such versatility can be important to you.

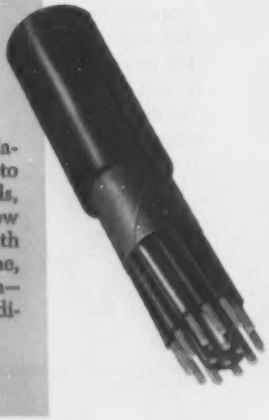
At Niagara Mohawk's new Albany Station, over 150 miles of Rome power and control cables are installed. Their Dunkirk Station, completed in 1951, also has many miles of Rome products.

The junction boxes at the Pittsburg plant look like this—neat termination of cables to busses. Miles of Rome copper control cables and Rome aluminum power cables are among the products used here.

Rome Cable engineers *worked with* PG&E and Bechtel Corporation engineers to make sure Rome cable was right for the job and right on the job, as scheduled. This is the kind of service *you* can expect from Rome.

Rome station control cable

RoLene (polyethylene) insulation is virtually impervious to oxidation, oils, most chemicals, water, d-c electro-osmosis, low temperatures. Synthinol sheath is tough, highly resistant to flame, moisture, corrosion, abrasion—has long life under severe conditions.



Rome power cable

RoZone premium quality oil base insulation is resistant to corona action, aging; shows high stability in water; has excellent electrical characteristics; is safeguarded by ionization testing of every foot of cable rated 3000 volts and over. RoZone exceeds all requirements of ASTM specification D-574. RoPrene sheath (Neoprene) protects cable against damage, abrasion, is easy to pull.

gain from the coast to coast acceptance of

Rome power and control cables

Are there any doubts in your mind concerning the power and control cable you should specify for your requirements? Then consider this—

From Pacific Gas & Electric's new 600,000 KW plant at Pittsburg, California, to Niagara Mohawk's new 400,000 KW station near Albany, New York, there are hundreds of utilities whose experience with Rome cable can guide YOU in saving time, work and risk of costly failure.

These two facts show you how:

First, in relation to over-all expense of plant and equipment, cable is your smallest item of expense. But it can be the most costly, if it fails! Therefore, it pays to buy the best.

Second, many products—and cable is one of them—look alike. They must meet Underwriters Laboratory requirements. But it's the people behind the product—the precautions they take in making it—that account for the superiority of Rome products on a performance basis.

Experience proves merit

For example, miles of RoZone-RoPrene aluminum 5 KV and 600 volt auxiliary power cable have gone into the PG&E $80,000,000 Pittsburg plant.

At Niagara Mohawk about 110 miles of Rome RoLene insulated control cables and 41 miles of RoZone-RoPrene power cables were installed. *In both cases, these installations were preceded by other Rome installations.*

Confidence based on experience? Sure. Lots of it. RoZone is a premium quality oil base type of insulation which exceeds all requirements of ASTM specification D-574, *assuring unquestioned reliability.*

Ionization tested

It's resistant to corona action and aging. It shows high stability in water and has excellent dielectric characteristics. As a further safeguard, *every foot of Rome power cable rated at 3000 volts and over is subjected* to ionization testing as a standard manufacturing procedure . . . your safeguard of dependable performance.

And if you need any special constructions, Rome has the kind of research and engineering people who can win and hold your confidence. Your inquiry is welcomed.

NEW 45-minute sound color film "CABLE—PATHWAY OF POWER" now available for showings to technical personnel. For bookings, write to Rome Cable Corporation, Rome, New York.

Take a positive step toward eliminating the headaches and red tape connected with so many cable purchases. Rome's helpful, friendly service can benefit YOU. Fill in the reader-service slip below and mail it today.

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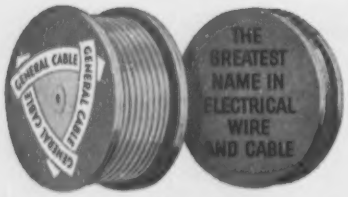

BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

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We would like you to think about this engineering service next time you face a wire or cable problem.

You see, our engineering staff is recognized as one of the industry's most authoritative groups of its kind. Ready at any time...to go anywhere, General Cable engineers can assist you in the solution of any electrical wire or cable problem...can quickly recommend and provide the most practical product for the job at the least possible cost.

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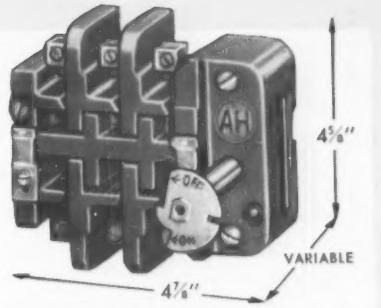
ARROW·HART

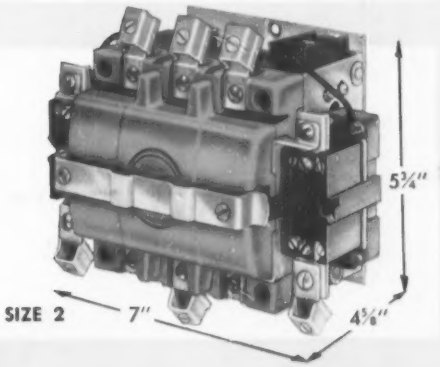
"RAD" Disconnect

ARROW AH HART

PLUS

ADVANCED DESIGN TYPE "RA" Motor Starter





provides you with the FINEST COMBINATION ON THE MARKET

Here's why... TYPE "RAC"

"RAD" DISCONNECT . . .

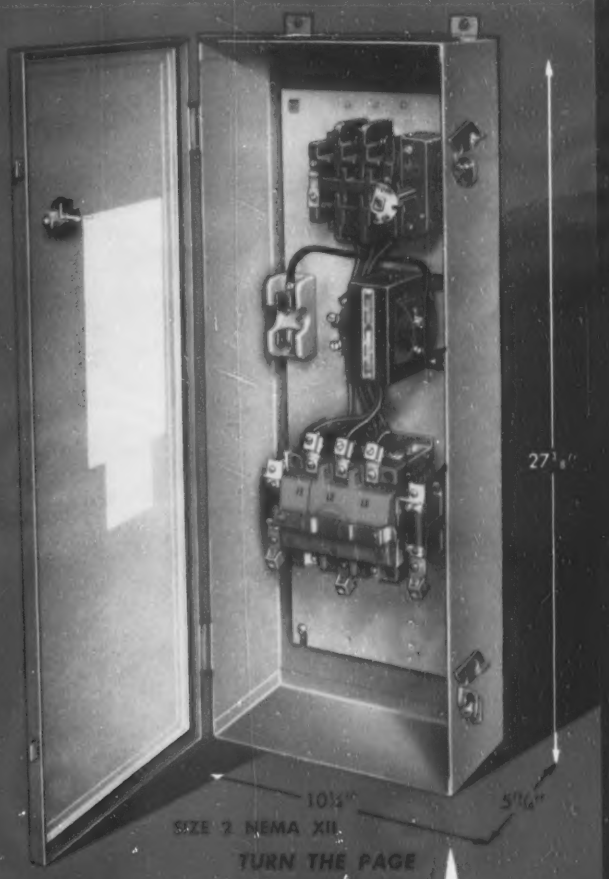
is a completely new, front operated design offering important advantages for both safety and convenience including: HEAVY, DOUBLE BREAK, BUTT TYPE SILVER CONTACTS for long life • COMPLETELY VISIBLE CONTACTS so maintenance man can SEE that Disconnect is off • CONTACTS ON VERTICAL PLANE prevent accumulation of breakdown material • CONTACT CARRIER INSTANTLY REMOVABLE for inspection or replacement • SIMPLE, SAFE, STURDY MECHANISM . . . cover can't be opened with Disconnect on, handle must be turned to "Open" with Disconnect "Off" •SELF-LOCATING HANDLE PROVIDES FOR THREE LOCKS and locks only in the "Off" position, as standard.

TYPE "RA" STARTER . . .

is a revolutionary, new design with a completely different type of operating mechanism. Important benefits made possible by this first real advance in motor control design in over 20 years include: GREATLY REDUCED SIZE and WEIGHT • IMPROVED PERFORMANCE and DEPENDABILITY • STRAIGHT-THRU FRONT WIRING • ALL PARTS EASILY ACCESSIBLE FROM FRONT • VERTICAL CONTACT POSITION prevents accumulation of dust.

TYPE "RAC" BOX . . .

features: SEAM WELDED CONSTRUCTION • FOAM NEOPRENE GASKET retained by channel in cover • MOUNTING PLATE REMOVABLE with all equipment without removing any screws • MINIMUM of 1" SPACING FROM ALL LINE and LOAD TERMINALS TO BOX • OIL DRIP SHIELD and EXTERNAL MOUNTING FEET • SELF-ALIGNING HANDLE • SELF-SECURING COVER LATCHES.



TURN THE PAGE FOR ADDITIONAL INFORMATION

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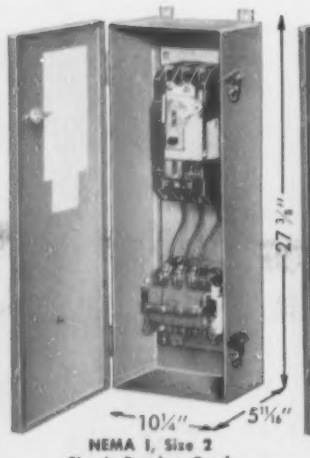
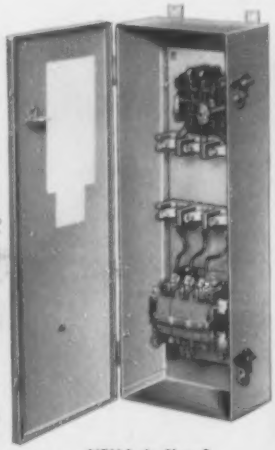
New TYPE "RAC" Combination Starters

AVAILABLE . . .

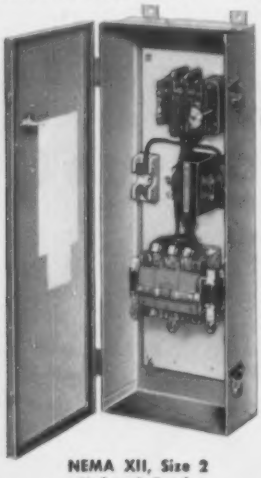
- With OILTIGHT (NEMA TYPE XII) ENCLOSURE . . . built to JIC STANDARDS
- With GENERAL PURPOSE (NEMA TYPE I) ENCLOSURE
- With DISCONNECT . . . Fused or Unfused Type
- With CIRCUIT BREAKER TYPE DISCONNECT
- ACROSS-THE-LINE, REVERSING and TWO-SPEED TYPES
- In NEMA SIZES 0, 1 and 2 . . . with 3 and 4 on the way
- With or without CONTROL CIRCUIT TRANSFORMER, LOCAL CONTROL and OTHER MODIFICATIONS



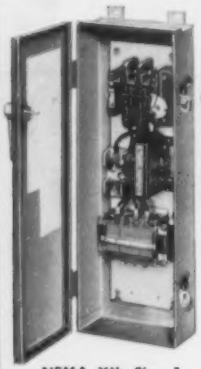
NEMA I, Size 2
Circuit Breaker Comb.



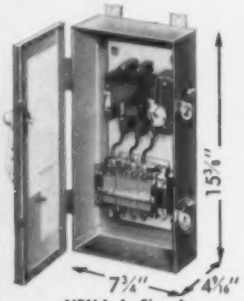
NEMA I, Size 2
Fused Comb.



NEMA XII, Size 2
Unfused Comb.



NEMA XII, Size 1
Unfused Comb.



NEMA I, Size 1
Unfused Comb.

Modernize all your electrical equipment with ARROW-HART Advanced Design MOTOR CONTROLS

Replace WITH ARROW-HART ON OLD MACHINES

A COMPLETE LINE FOR EVERY INSTALLATION NEED

Magnetic Starters and Contactors in Across-the-Line, Reversing and Two-Speed Types • Combination Starters • Explo-Safe and Weatherproof Starters and Contactors • Control Centers • Electronic Variable Speed Packaged Drives • "PPS" Push Pull Selector Switches • Push Button Stations in Oiltight, Standard Duty, Heavy Duty, Weatherproof and Explosionproof types • Midget Relays • Manual Starters and Starting Switches • Limit Switches . . . and Specialized Controls for Many Industries

Specify ARROW-HART FOR NEW MACHINES

SEND NOW FOR COMPLETE INFORMATION

Industrial Control Division
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 Hawthorn Street, Hartford 6, Conn.

☐ *Please send literature describing the Type "RAC" Combination Starter.*
☐ *Please send catalog covering the complete A-H Motor Control Line.*

NAME_____
POSITION_____
COMPANY_____
CO. ADDRESS_____
CITY_____ ZONE_____ STATE_____

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INDUSTRIAL CONTROL DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 HAWTHORN STREET, HARTFORD 6, CONN., U.S.A.

OFFICES, SALES ENGINEERS AND WAREHOUSES IN: ATLANTA, BOSTON, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, DETROIT, HOUSTON, INDIANAPOLIS, KANSAS CITY MO., LOS ANGELES, MILWAUKEE, MINNEAPOLIS, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS, SAN FRANCISCO. In Canada: ARROW-HART & HEGEMAN (CANADA) LTD., MT. DENNIS, TORONTO.

PRINTED IN U.S.A.

FIRE!

Unless you get the jump on fire the minute it starts, you stand a good chance of kissing your business good-bye.

That's why it's so important to have a Kidde portable extinguisher near *every* fire hazard in your plant.

Protect motors, electrical equipment, flammable liquids and machinery with Kidde portables. Then, when fire strikes, you're ready for it.

Just grab a Kidde CO_2 or dry chemical portable, aim the horn, pull the trigger, and—Whoosh! No more fire!

Your *next* fire could be your *last* . . . Contact Kidde today!

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The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

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GUARANTEED PERFORMANCE

....up to 35,000 Volts with De Laval Insulating Oil Purifiers

It is mighty important to know that your transformer and circuit breaker oil actually has the dielectric strength you think it has.

With De Laval Insulating Oil Purifiers you can set your mind at rest. Every one is *guaranteed*—when operated at its rated capacity—to reduce the water content of new transformer oil at 90° F. from an initial 1/10 of 1% to 1/1000 of 1% (one part of water in 100,000 parts of oil) . . . raising dielectric strength up to 35 kv. *with a single pass through the* Purifier.

Write for De Laval Bulletin TR-1

Among the Many Users of De Laval Insulating are:

ALABAMA POWER CO.
GEORGIA POWER CO.
MICHIGAN GAS & ELECTRIC CO.
TENNESSEE VALLEY AUTHORITY
WISCONSIN LIGHT & POWER CO.
GENERAL ELECTRIC CO.
CONSUMERS POWER (MICH.)
CHICAGO, MILWAUKEE & ST. PAUL R. R.

THE DE LAVAL SEPARATOR COMPANY
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DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5

DE LAVAL

GUARANTEED INSULATING OIL PURIFIERS

POWERS *American* AERIAL EQUIPMENT

AERIAL TOWERS

Series 7A-01 . . . in sizes for safe, smooth elevation to 21′ or 25′. Equipped with telescopic ladder. Operation from cab or tower. Platform revolves 360°.

HYDRAULIC AERIAL TOWERS

Series TW-2 . . . enables workmen to reach areas more than 35′ above ground. Can be operated from tower or truck cab. Platform revolves full 360°. Telescopic ladder is standard equipment.

REVOLVING Fully-Powered HYDRAULIC AERIAL LADDERS

Series HL-35 . . . elevates, extends, lowers, and retracts by *hydraulic power*. Available in sizes having ground-to-platform height up to 35′. Revolves full 360°.

REVOLVING AERIAL LADDERS

Series 5510 . . . perfectly balanced to permit fast, easy elevation. In sizes having 23′6″, 26′6″, and 30′6″ ground-to-platform height. Can be spotted at angles from 30° to 75°, and revolved full 360°.

HINGED LADDER RACK ASSEMBLIES

Standard and special racks, with extension ladders, can be furnished for installation on Powers-American bodies. These include racks with standard 24′ ladders, and racks with braced or trussed ladders to reach heights up to 30′.

A descriptive bulletin is available on each item of aerial equipment in the Powers-American line. Bulletins, plus prices and complete details, are yours for the asking.

McCABE-POWERS AUTO BODY COMPANY

MAIN OFFICE
5900 NO. BROADWAY • ST. LOUIS 15, MO.

WESTERN OFFICE
428 LATHAM SQ. BLDG. • OAKLAND 12, CALIF.

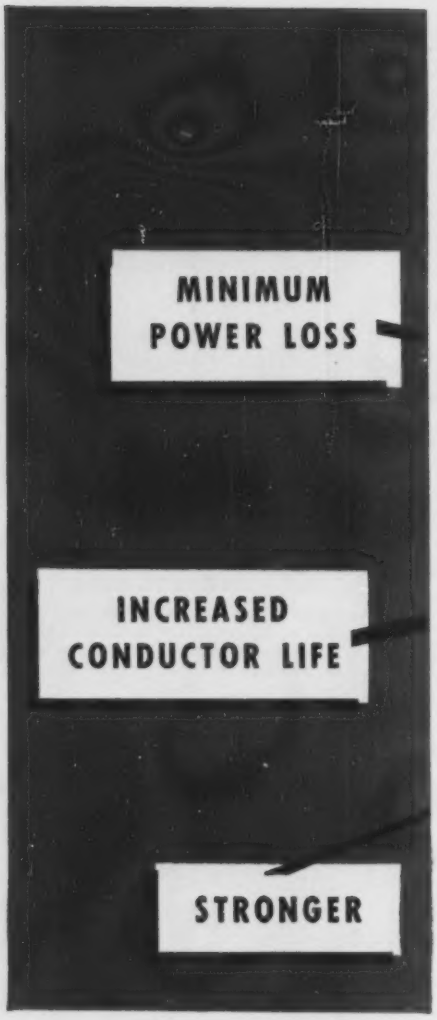
DROP-FORGED for GREATER STRENGTH

BTC

M.P.L. Aluminum

SUSPENSION CLAMP

for A.C.S.R.
and All-Aluminum Conductors

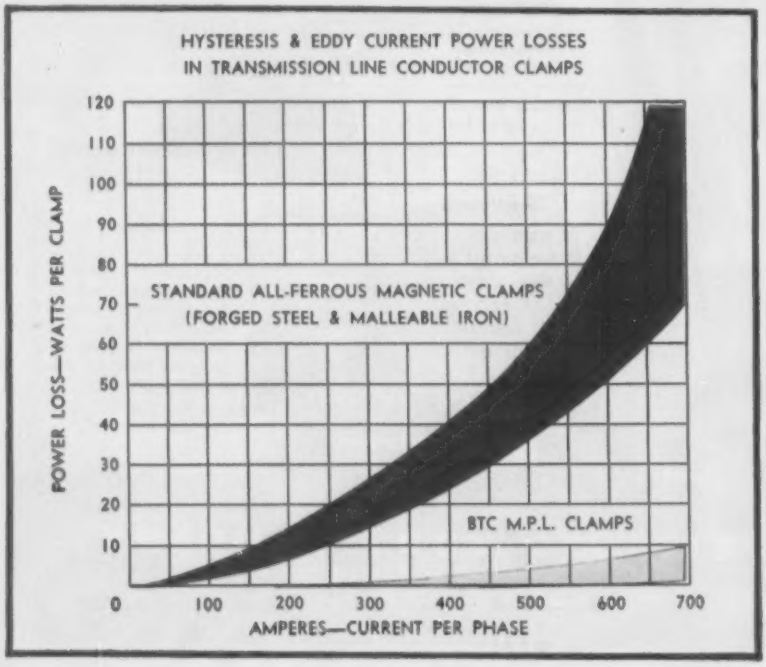


MPL MINIMUM POWER LOSS

The use of non-magnetic Aluminum Alloy Clamp Body reduces eddy current and hysteresis losses to a minimum . . . prevents temperature rise in the clamped section of the conductor, which will operate at lower temperature than in the span.

CONSIDERABLY STRONGER

Forgings, in any metal, are employed where better strength, soundness and finish are required than can be obtained by other processes. Forging produces a fine, close-grained structure, with the grain flow following the contour of the part and with optimum mechanical properties and ability to withstand severe loading, sudden shock and frequent reversal of stress.

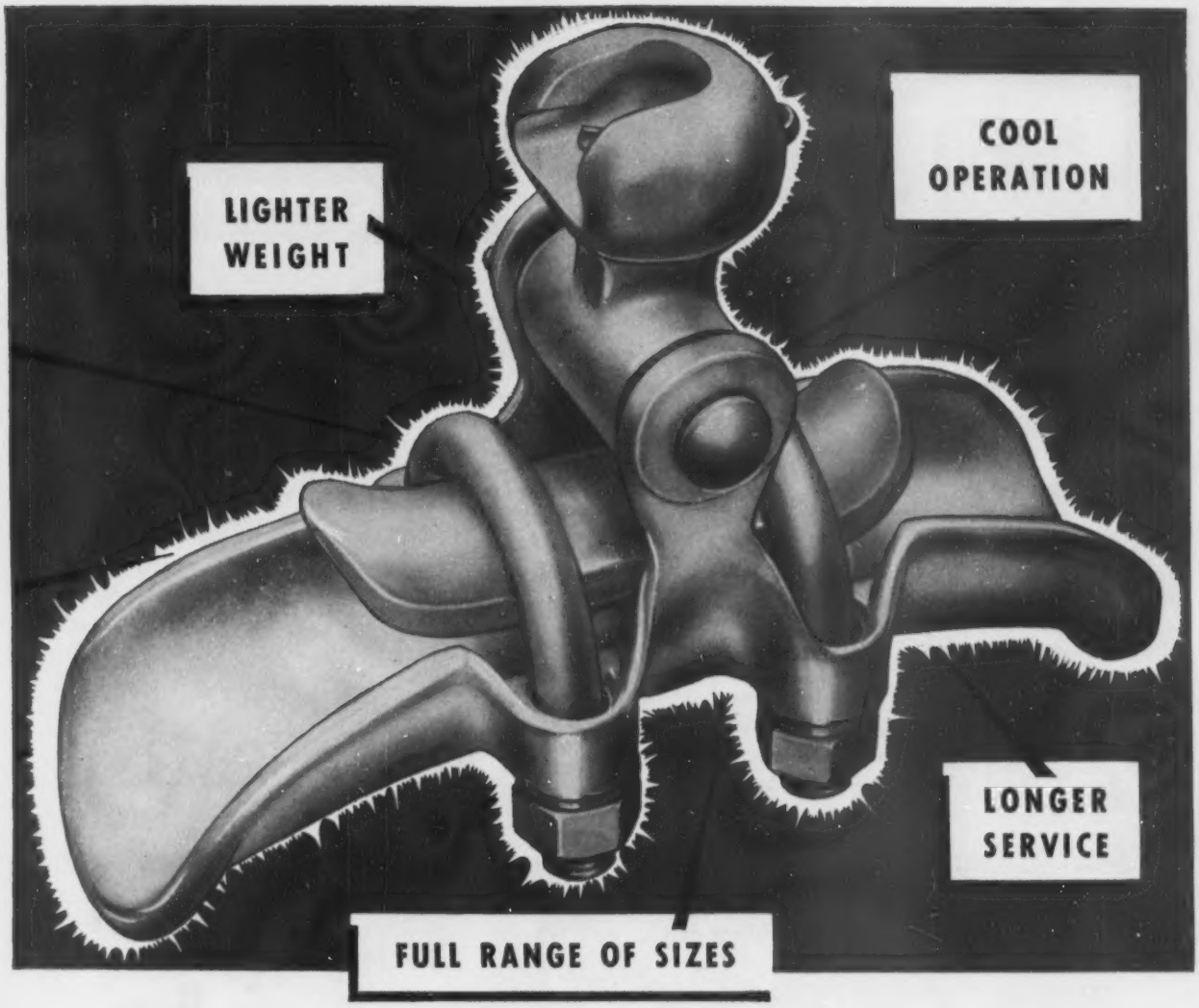


The BTC Clamp Body is FORGED Aluminum alloy, the strongest recommended for the purpose, fully heat-treated to develop maximum mechanical properties.

In the heat-treated condition, the ultimate strength and hardness is more than twice . . . and the yield strength and endurance limit more than three times . . . that of alloys used in other processes. The more-than-adequate catalouged strength ratings of BTC Clamps are conservative and are exceeded in actual tests.

LIGHTER WEIGHT

Heavy sections or reinforcing ribs, necessary in other materials to develop desired strength and prevent collapse or breakage of the clamp under clamping U-Bolt pressure, are not required in forged clamps. Undesirable weight is eliminated without sacrifice of strength.



INCREASED CONDUCTOR LIFE

The light weight and generous longitudinal radius of the conductor seat minimize the effects of conductor vibration. The conductor is not bent over a small radius at any point.

Clamping pressure is greatest at the center, gradually decreasing toward each upswept end of the keeper. Clamp and Keeper ends are liberally bell mouthed and beaded to prevent conductor damage and formation of corona.

The conductor is fully supported in the clamp body. There are no open pockets at U-Bolt holes to allow distortion of the conductor under clamping pressure.

LONGER SERVICE

The superior strength insures against failure under severe loading. The greater hardness prevents excessive wear at points in contact with the supporting pin.

The close-grained, non-porous structure of the forged clamp body effectively prevents the destructive internal seepage of corrosive elements, a cause of failure in some transmission line fittings produced by other processes.

FULL RANGE OF SIZES

BTC offers a choice of exactly the right clamp for each size of A.C. S.R. or all-aluminum conductor. The close dimensional fidelity of the die-forged and die-formed parts makes unnecessary any bore size allowance for manufacturing variations in the clamps.

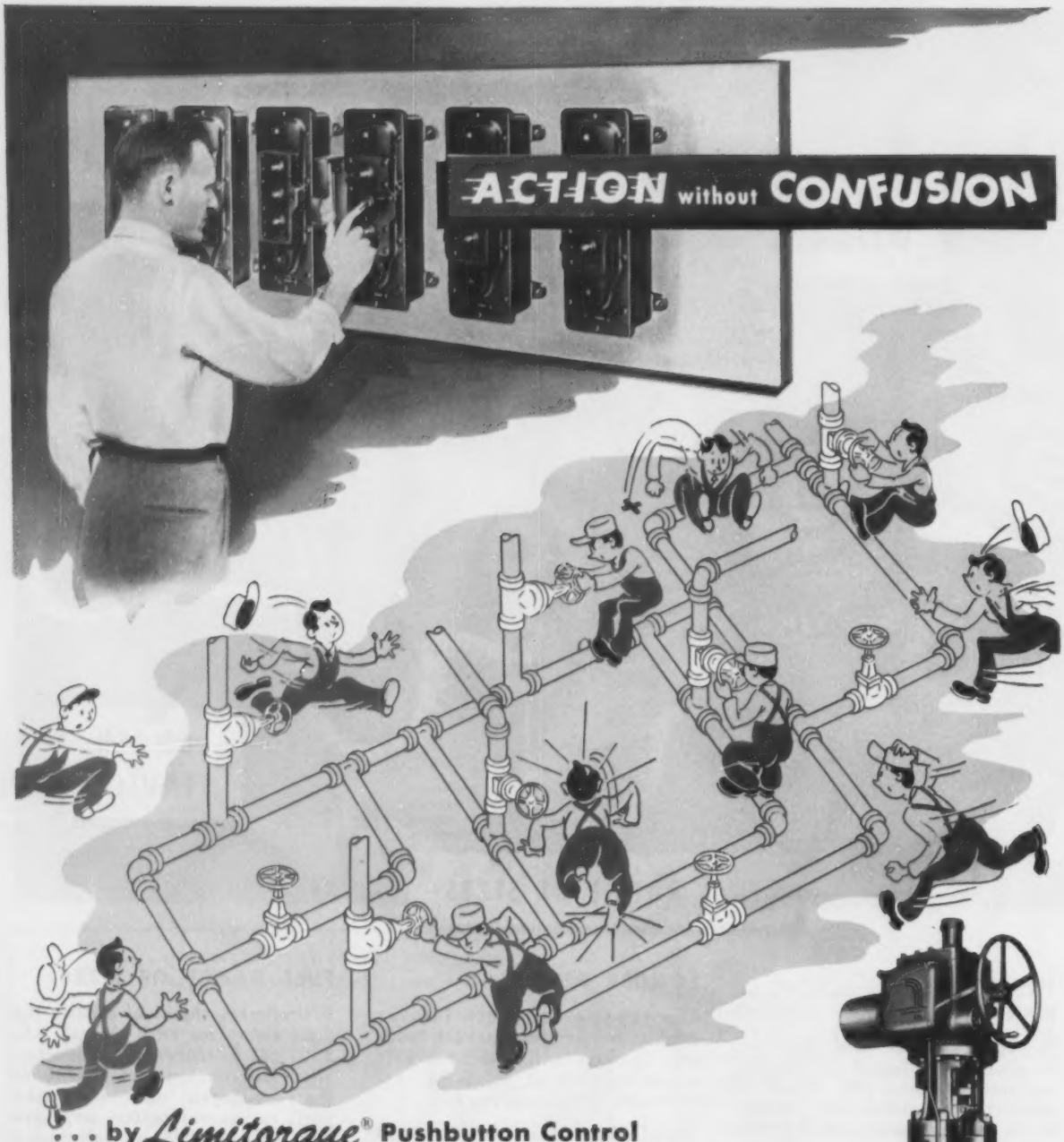
Specify BTC MPL Aluminum Suspension Clamps from your insulator manufacturer. They are an important part of BTC's complete line of forged transmission line hardware.

Sold Through Your Insulator Manufacturer Only

Drop Forged **BTC** *Hi-Line Hardware*

The BREWER-TITCHENER Corporation

Cortland • New York



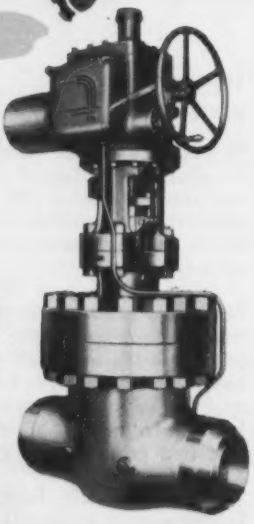
. . . by *Limitorque*® Pushbutton Control

Where convenient automatic valve operation is desired, and where valves are inaccessibly located, or where emergency may require *rapid positive operation* from a remote point, LimiTorque is favored for its simplicity and dependability. Just a push of a button starts and stops LimiTorque.

LimiTorque provides complete safety to workmen, by eliminating the need of climbing to high or hazardous locations for manual valve operation . . . and also vitally important, valve operating parts are protected by torque limit switch which instantly shuts off the motor, if foreign obstructions are met during the closing cycle.

LimiTorque may be actuated by any available power source . . . electricity, air, water, gas, or oil.

For complete details about LimiTorque, send for Catalog L-54.



PHILADELPHIA GEAR WORKS, INC.

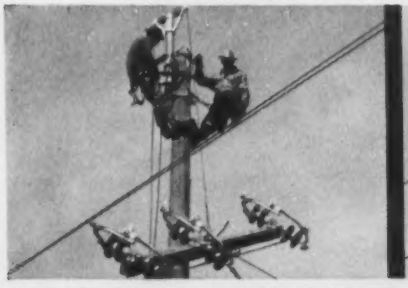
ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears & Speed Reducers

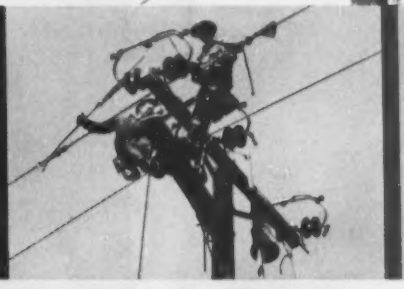
LimiTorque Valve Controls

KPF AIR BREAK SWITCHES

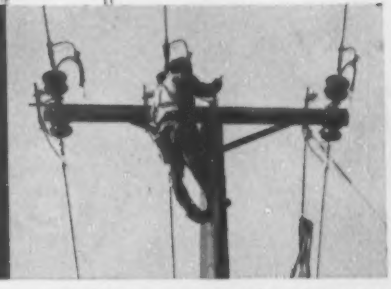
1 Sturdy factory-assembled phase units are bolted to cross-arm and push-pull interphase control rods installed on the ground. (Installation is equally simple in the air on installed cross-arms.)



2 At pole top, linemen receive switch bolted to cross-arm and ready to install on pole. Simple design and use of quality materials means KPF phase units are rugged, yet amazingly light weight.



3 Cross-arm bolted to pole, braces and first section of control rod installed. Linemen connect conductors quickly and easily to any standard strain clamp and dead-end direct to phase units.



4 Conductors connected, crank arm being adjusted on push-pull interphase control rod. Like KPF switches and Quick-Breaks, KPF controls need no lubricating. They crack off any icing, are never affected by cross-arm warpage.

Time-tested KPF switches install simply, easily—in 1/2 normal time

KPF switches—the switches that look different because they *are* different—install differently, too. Experience of leading Western power companies shows that KPF switches are normally installed in ½ the time required for complex, cumbersome ordinary equipment. Each KPF phase unit is light weight, readily handled by one man. No extra cross-arms or special supporting structures are needed. Each phase unit is fully assembled, tested and adjusted at the factory. The unit is ready to operate when it reaches the job—no waste of lineman's time. Dependable KPF switches may be mounted horizontally, vertically or triangularly with equal success and long-term, trouble-free service.

For the world's simplest, surest, lowest cost air break switch, specify KPF—standard for nearly 50 years.

KPF
AIR BREAK SWITCHES
Standard for nearly half a century

New catalog gives complete specifications, detail drawings, installation data.

5 Installation complete. Lineman installs operating lever and last section of control rod. Note the neat, clean pole top appearance of KPF switches—a familiar sight throughout the West on such famous systems as PG&E, Southern California Edison and others.

KPF ELECTRIC COMPANY
1624 East Alpine Avenue, Dept. E, Stockton 5, California

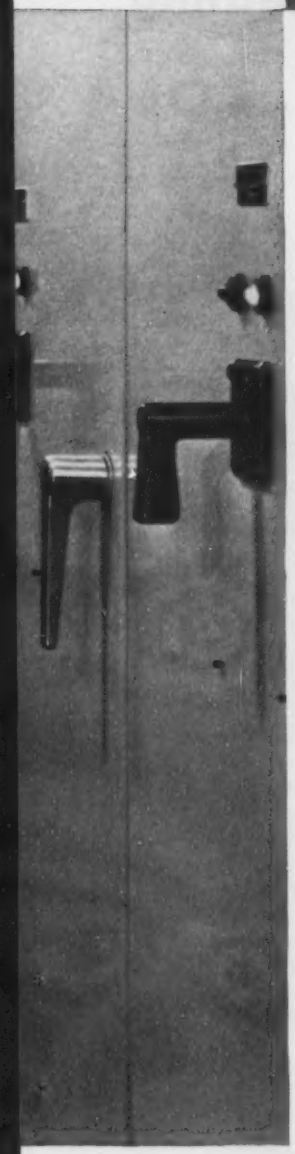
1951 GENERAL ELECTRIC INTRODUCES SELF-X, A NEW FLAME-RETARDANT INSULATION

1954 SELF-X GUARDS OVER 10,000 GENERAL ELECTRIC METAL-CLAD UNITS

G-E METAL-CLAD SWITCHGEAR lineup features Self-X, G.E.'s service-proved flame-retardant insulation, at vital points.

COFFIN AWARD. Nicholas F. Arone, laboratory engineer in G-E Switchgear Product Laboratory, receives Company's highest employee honor—the coveted Coffin Award—from G. E. Burens, General Manager, Switchgear and Control Division, for developing Self-X insulation.

COMPARISON TEST shows why Self-X insulation gives better protection to metal-clad switchgear. In this photograph, taken immediately after both pieces of insulation were withdrawn from the flame, N. F. Arone (at right) holds a piece of ordinary insulation which continues to burn, while the Self-X held by H. F. Hentschel, General Manager—Medium Voltage Switchgear Department, stopped burning as soon as flame was removed. Other tests of Self-X included exposure to electric arc.



Self-X insulation proved by three years of service

Back in 1951, the first sheets of a new type of flame-retardant, self-extinguishing insulation, just developed by General Electric, were installed in a metal-clad switchgear unit.

In severe laboratory tests, the new Self-X insulation proved that it could stand up even under direct flame or an electric arc. As soon as direct flame contact was removed, polyvinylchlorides in the laminated sheets went to work *fast*. Smothering action started—and the fire was put out in less than a minute.

That was over three years ago. Today, this service-tested insulation developed by General Electric Company is acting as a built-in fire extinguisher for over 10,000 switchgear units. Its flame-retardant features make it ideal for bus and cable supports, insulating barriers, between compartments, box carriers for arc chutes—all vital spots.

Self-extinguishing insulation is just one of the advanced safety features of G-E Metal-Clad Switchgear, which helps guard utility and industrial power distribution systems. To learn more about it, call your nearest G-E Apparatus Sales Office or Authorized Agent. Or write for bulletin GEA-5664 to General Electric Company, Schenectady 5, N.Y.

511-4

Progress is our most important product

GENERAL ELECTRIC

Hotpoint

has PROVED that water heating is done best by ELECTRICITY

Hotpoint Electric Water Heaters have proved by their efficiency that heating water by electricity is not only practical . . . it's the *best* way to do it. The American public has purchased 6,000,000 electric water heaters. This means that there are 6,000,000 more electric power buyers developing utility revenue. And further—these are steady, round-the-clock customers who help balance your load during off-peak hours.

Hotpoint offers a complete line of water heaters to meet every need. There's a full range of sizes in both round and table-top models. Every unit features the famous MAGIC CIRCLE® heat with Calrod® heating units. Water is heated by conduction, the most direct and simple way.

Because Hotpoint pioneered this business, and, because Hotpoint Water Heaters are the recognized leaders, nearly 2,000,000 of the water heaters in use today were made by Hotpoint. Learn all the facts about Hotpoint Automatic Electric Water Heaters from your local Hotpoint distributor. Keep building acceptance for electric water heaters, and build assured revenue for the future with Hotpoint . . . the world's finest.

Again Hotpoint *looks at Tomorrow, Today*

HOTPOINT Co. (A Division of General Electric Company) 5600 West Taylor Street, Chicago 44, Illinois

it's time for a new meter...

when the Wilsons...

buy an air-conditioner

The Wilsons have joined the thousands of American families whose growing demands for power obsolete the old two-wire meters that measure their loads. They will need a three-wire service to provide the voltage and capacity they now require.

The new Sangamo J2 three-wire meter, with its straight line accuracy up to 100 amperes, will measure this increased load and will provide for any contingency of future load growth.

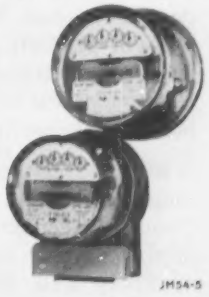
High thermal capacity and straight overload characteristics enable the J2 to measure accurately up to 100 amperes. Because of its high torque, the Sangamo J2 will also accurately measure light loads for many years without recalibration. The J2 is *the* slow speed meter that makes fewer revolutions per kilowatthour—bearings last longer.

When you invest money in meters you know are going to have to handle greater and greater loads, protect your investment by choosing a meter with plenty of reserve capacity. Choose the new Sangamo J2—the first . . . and finest . . . 15 ampere meter with 100 ampere capacity.

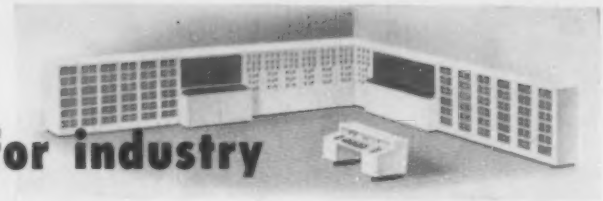
SANGAMO ELECTRIC COMPANY, *Springfield, Illinois*

A METER WITH STRAIGHT LINE ACCURACY

UP TO 100 AMPERES

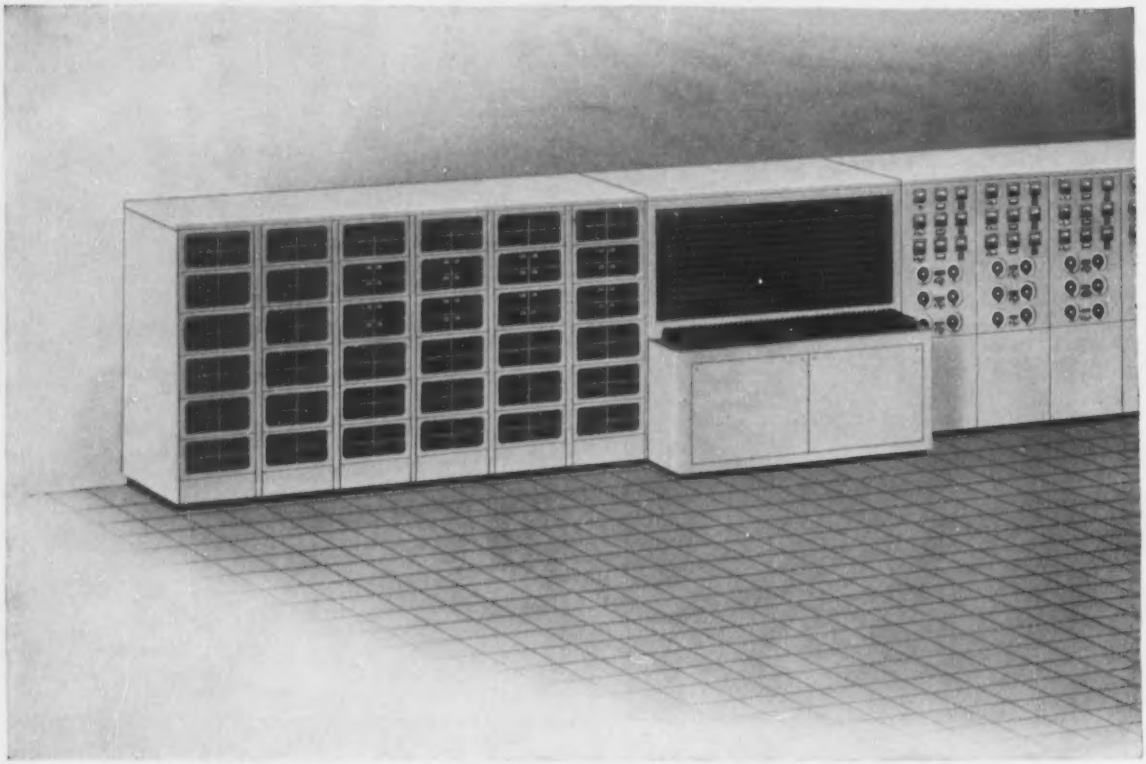


JM54-5



Another service for industry

I-T-E now offers a complete line



I-T-E System Analyzer, with console metering desk, arranged for 21 generators and approximately 450 circuit components.

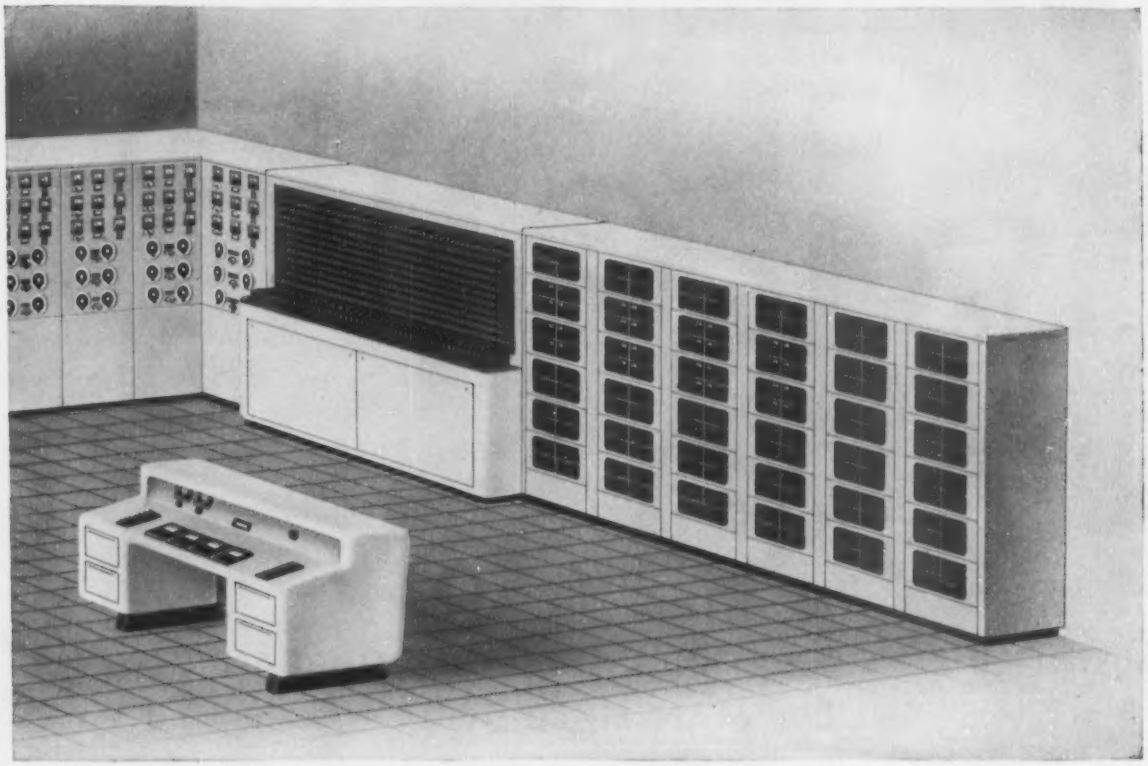
I-T-E continues to support America's greatest electrical expansion

KWHR capacity has doubled in the last ten years. Present trends indicate another doubling in the decade to come. More effective equipment for system planning, as well as new power-generation, transmission, and distribution equipment, will be required to handle this vastly increasing capacity.

Recognizing the need for more effective planning equipment, the I-T-E Circuit Breaker Company is making available a complete line of power system analyzers, designed for utmost accuracy and speed of operation. These analyzers provide solutions to system problems resulting from rapid growth and interconnections, and afford studies otherwise too difficult because of limited technical manpower and time. These units incorporate features covered by the patents and latest designs of Professor E. B. Phillips, University of Kansas.

I-T-E thus continues to support industry by providing more products, broader lines, and increased production of the finest-quality equipment.

# of POWER SYSTEM ANALYZERS



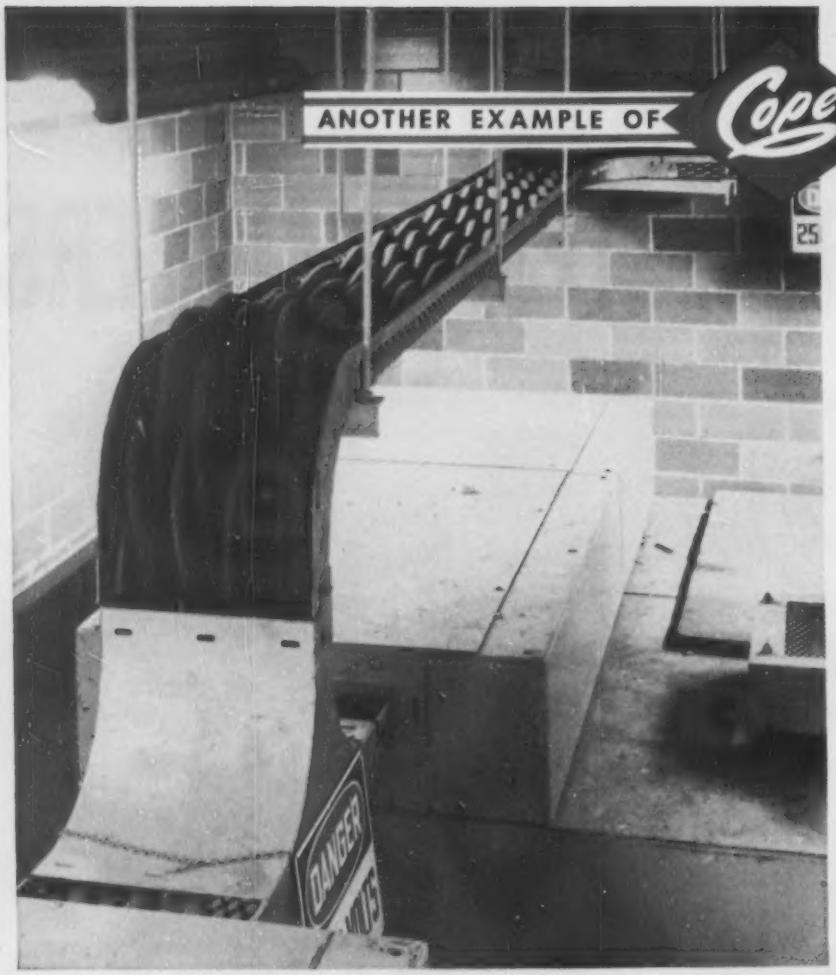
- 60 CYCLE POWER SUPPLY
- GREATER ACCURACY
- FASTER OPERATION
- COMPACT DESIGN
- MINIMUM MAINTENANCE
- SIMPLIFIED INSTALLATION

For details, contact the I-T-E Field office nearest you. Look in your Classified Directory under "Electric Equipment."

The Symbol of Quality Switchgear

I-T-E CIRCUIT BREAKER COMPANY
19TH AND HAMILTON STS., PHILADELPHIA 30, PA.

SYSTEM ANALYZERS



A SINGLE RUN OF COPE CABLE TROUGH CAN DO A MAN-SIZED JOB

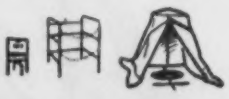
The above photograph, taken in a section of the new Scott Paper Co. plant at Everett, Washington shows one run of Cope Cable Trough carrying four sets of three phase triplexed cable carrying 2300 volts properly spaced to give a free-air rating.

Because of its low cost and ease of installation, Cope Cable Trough is extremely popular as a standardized system for supporting power and control circuits in the industrial and utility field.

Cope Cable Trough is available in straight runs and a wide range of fittings (tees, elbows, drop-outs, etc.) which enables the entire system to be quickly and easily erected at the job site to conform to any layout.

Write today for further information. Ask for Bulletin 6W.

You know Cope by these products



Cope

T. J. COPE, INC.

711 SOUTH 50th ST., PHILADELPHIA 43, PA.

GRATELITE CEILINGS

GRATELITE IN PEERLITE (Trademark)

GRATELITE IN V-C-U

GRATELITE IN TROFFER

GRATELITE IN E-LITE (Trademark)

GUTH

better lighting with

GRATELITE*

NOW available in **two** sizes — 11" x 48" and 16" x 48"

THE SIGHT-SAVING CUBES MAKE GRATELITE GREAT:

- High Foot-Candles
- Amazing Diffusion
- Low Brightness
- 45° x 45° Shielding—Greater Eye Protection
- Open Like a Louver
- Air-Conditioning Diffusion
- Noise Reduction
- Cleaned in 2 Minutes
- Strong and Rugged

FUNCTIONALLY CORRECT . . . AESTHETICALLY BEAUTIFUL

TENS OF THOUSANDS OF GRATELITES INSTALLED— MILLIONS OF CUBICLES OF SIGHT-SAVING LIGHT

Reports from all over the nation:

"No complaints—all compliments"
"...stay unbelievably clean"
"...nothing compares to it"
"...nothing but praise for GrateLite"

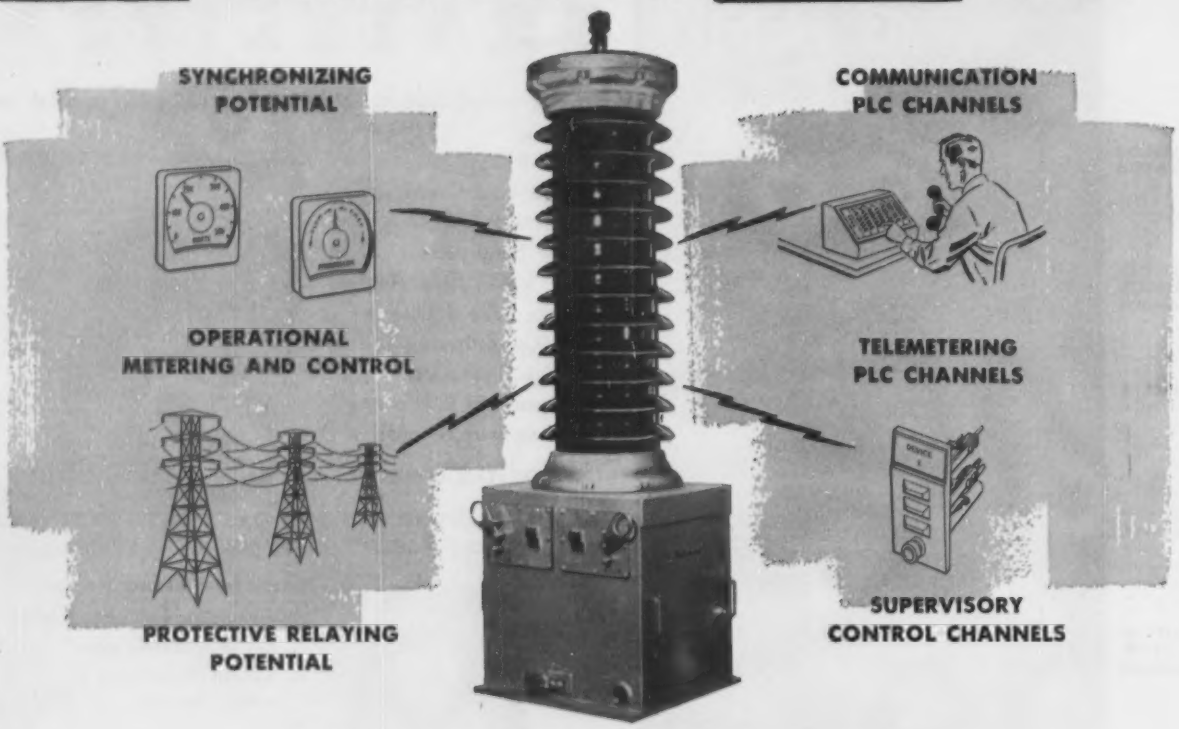
It's all in the sight-saving cubes— and only GrateLite has them!

*T. M. Reg. U. S. & Can. Pats. Pend.

Guth

THE EDWIN F. GUTH COMPANY ST. LOUIS 3, MO.

MORE CHANNELS AT LOWER COST



350% Greater Capacitance with

Motorola Aperiodic Coupler

(couples entire carrier spectrum with no tuning)

All of your carrier channels coupled and by-passed with one simple self contained unit—made possible by the utilization of 350% greater capacitance than in old-fashioned coupling capacitors.

Available in the same single base housing is an associated potential device complete with adjusting panel which may be used for operational metering, protective relaying, and synchronizing applications. If desired the adjusting panel may be installed at a remote location.

Suitable for either pedestal or suspension mounting, Motorola Aperiodic Coupling units are available in standard insulation classes . . . from 15 to 345 KV. They are designed to connect many power line carrier transmitters and receivers to a power transmission line and are essentially broad band filters capable of efficiently passing all signals in the power line carrier frequency band from 50 kc. to 200 kc.

Motorola Aperiodic Coupling units are in service in the largest utilities in the world. A partial list of users includes:

American Gas & Electric	Bonneville Power Adm. (U.S.D.I.)
Central P. & L. Co.	Bureau of Reclamation (U.S.D.I.)
Idaho Power Co.	Brazos Electric P. Corp., Inc.
Missouri P. & L. Co.	Pacific Power & Light Co.
Minnkota Power Co-op, Inc.	Alabama Power Co.
South Carolina E. & G. Co.	Central Illinois Public Service Co.
Pacific Gas & Electric Co.	Tennessee Valley Authority

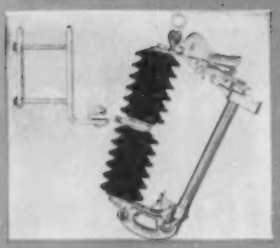
POWER UTILITIES EQUIPMENT DIVISION

Motorola Communications & Electronics, Inc.

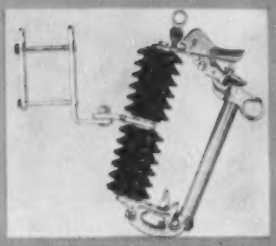
A SUBSIDIARY OF MOTOROLA, INC.

TECHNICAL BULLETIN ON REQUEST—DEPT. EW

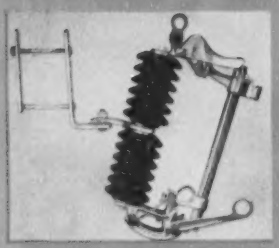
4501 AUGUSTA BLVD., CHICAGO 51



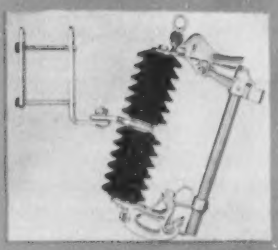
Type 33-D



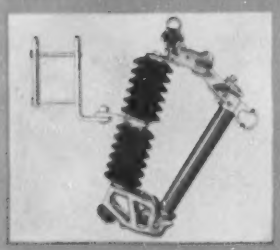
Type 33-DH



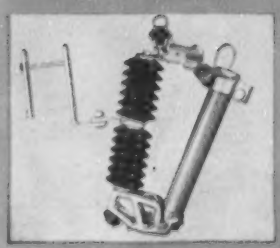
Type L-33-D



Type CV-33-D



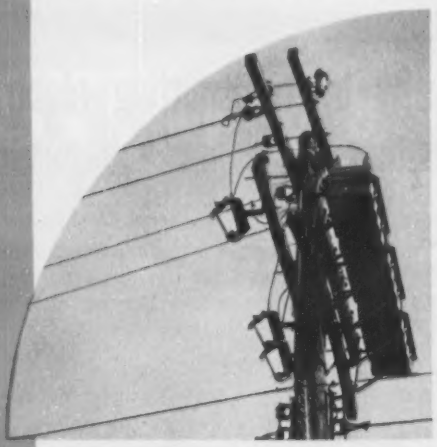
Type H-33-D



Type HH-33-D

58 Combinations

to meet your cutout requirements



Silver plated contacts are now standard on all Southern States cutouts.

No matter what your fusing problems are—excessive load-growth, isolated or special applications, meeting a tight budget, or others—Southern States cutouts will help you lick them. In the 33 series, fifty-eight combinations of voltage, current and interrupting ratings are available.

From this versatile line—ranging from the Type 33-D, to the extra heavy-duty, Type HH-33-D—you can select the cutout that meets your exact requirements.

Three methods of tube venting, interrupting ratings from 1,200 to 25,000 RMS amperes and continuous current ratings from 50 to 300 amperes, enable you to choose the cutout you need.

Complete data and information are available in our Bulletin 530-C, which we'll gladly send you on request.

Specify Southern States cutouts and be certain.

SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

Modernize Distribution Systems

with SORGEL Air-Cooled Transformers

Increase feeder capacity by transmitting electric power to load centers at higher voltages

The Most Practical Type Transformers to Reduce Voltage at Load Centers

Air-cooled dry-type transformers are the most practical type for indoor installations, and it is important that the transformers are of the best quality—SORGEL transformers. They require little or no maintenance; no liquid to check or replenish; no fire hazard; small and compact; economical; easy and convenient to install; no vault required.

Increased Efficiency

Sorgel air-cooled dry-type transformers are so quiet in operation that there is no disturbing hum; therefore, they can be installed in almost any convenient place inside of buildings, close to the load center. This results in shorter feeders, better voltage regulation, more efficient distribution, and lower wiring cost.

Easy and Low Cost Installation

All self-contained in a single unit. Three-phase transformers are also in a single unit, with simple connections to make. No separate mounting brackets or junction boxes to make or buy. Substantial wall brackets, with slots for bolts, or floor mounting base, are an integral part of Sorgel transformers. Roomy connection compartment with wide choice of knockouts. All transformers are equipped with solderless terminal lugs and permanent connection diagram.

Liberal Design for Full Rated Load

Sorgel transformers are guaranteed to carry the full rated load continuously. They are so liberally designed that they can safely carry an overload during an emergency.

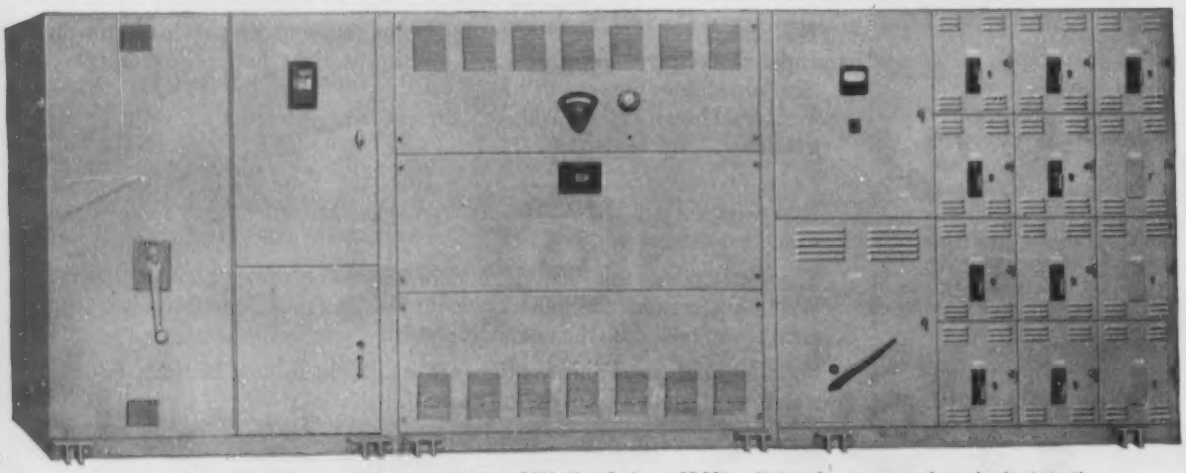
Large Variety for Every Purpose

These transformers are available in a large variety of sizes and types for every purpose. ¼ Kva to 1000 Kva single phase. 1 Kva to 3000 Kva 3-phase. All standard voltages, such as 120, 208, 240, 480, 600, 2400, 4160, 4800, 7200, 13,200, and up to 15,000 volts, and any intermediate or special lower voltages.

1 to 10 Kva 3-phase

A Perfect Partner for Substations

Sorgel transformers can also be incorporated in substations, complete with primary and secondary switchgear. They are procurable with any make of switchgear, and from any substation manufacturer.

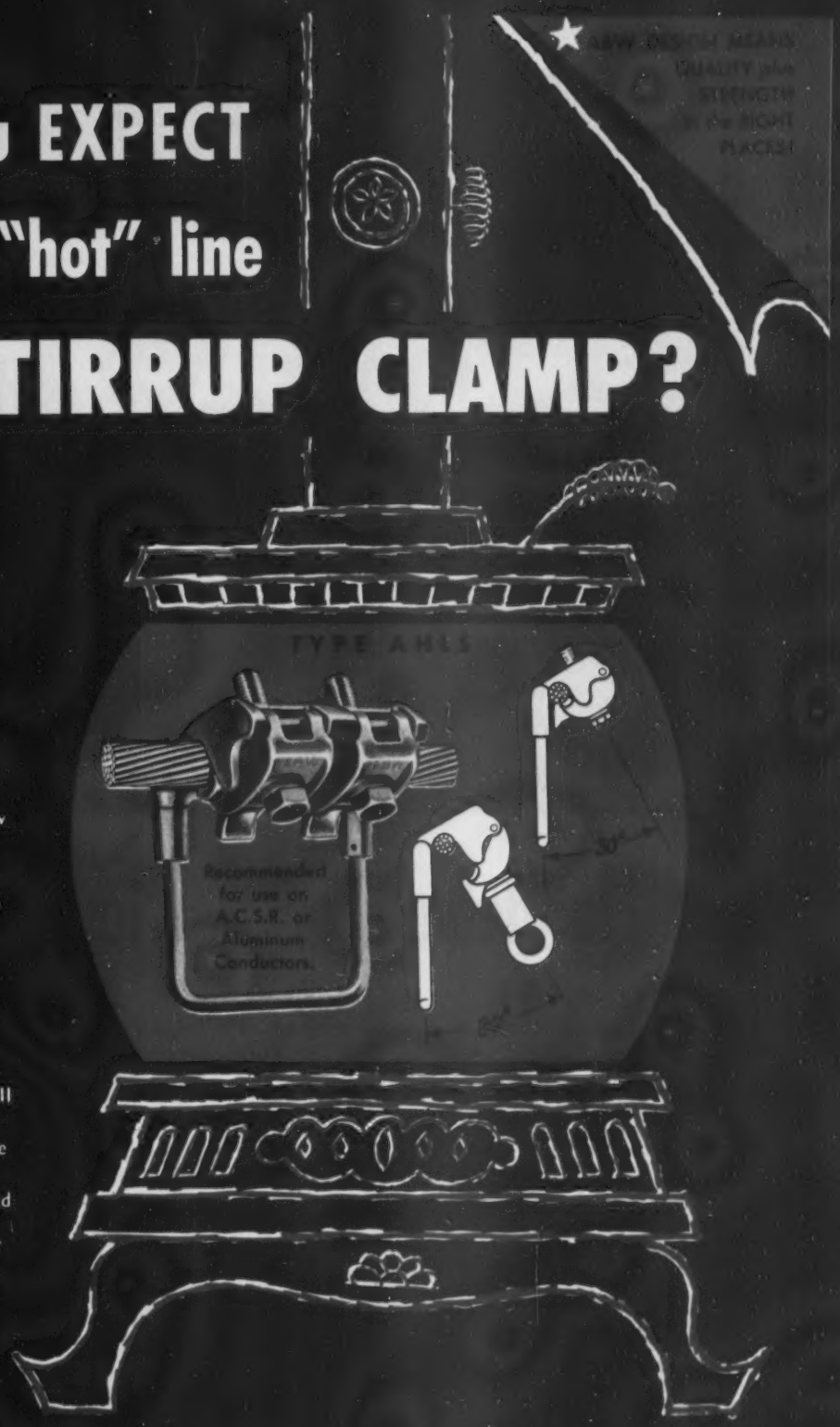


Unit substation, with primary switchgear—metering—2000 Kva 3-phase, 13,200 volt transformer—secondary circuit protection. Shipped completely assembled, wired and tested, ready to connect to lines. Nothing else to buy, make, or assemble.

SORGEL ELECTRIC CO., 834 West National Ave., Milwaukee 4, Wis.

what do you EXPECT of a "hot" line STIRRUP CLAMP?

- NO CONDUCTOR ARCING DAMAGE?
- QUICK, EASY INSTALLATION ON A "HOT" LINE?
- POSITIVE, EFFICIENT TIGHTENING WITH "HOT-STICK"?
- LARGE CONTACT AREAS?
- LONG, TROUBLE-FREE SERVICE?



ANDERSON answers **all** your requirements with a brand new one-piece **"Hook-over" Hotline Stirrup Clamp**... TYPE AHLS... designed for time-saving installation, longer service life and rugged, efficient dependability in service.

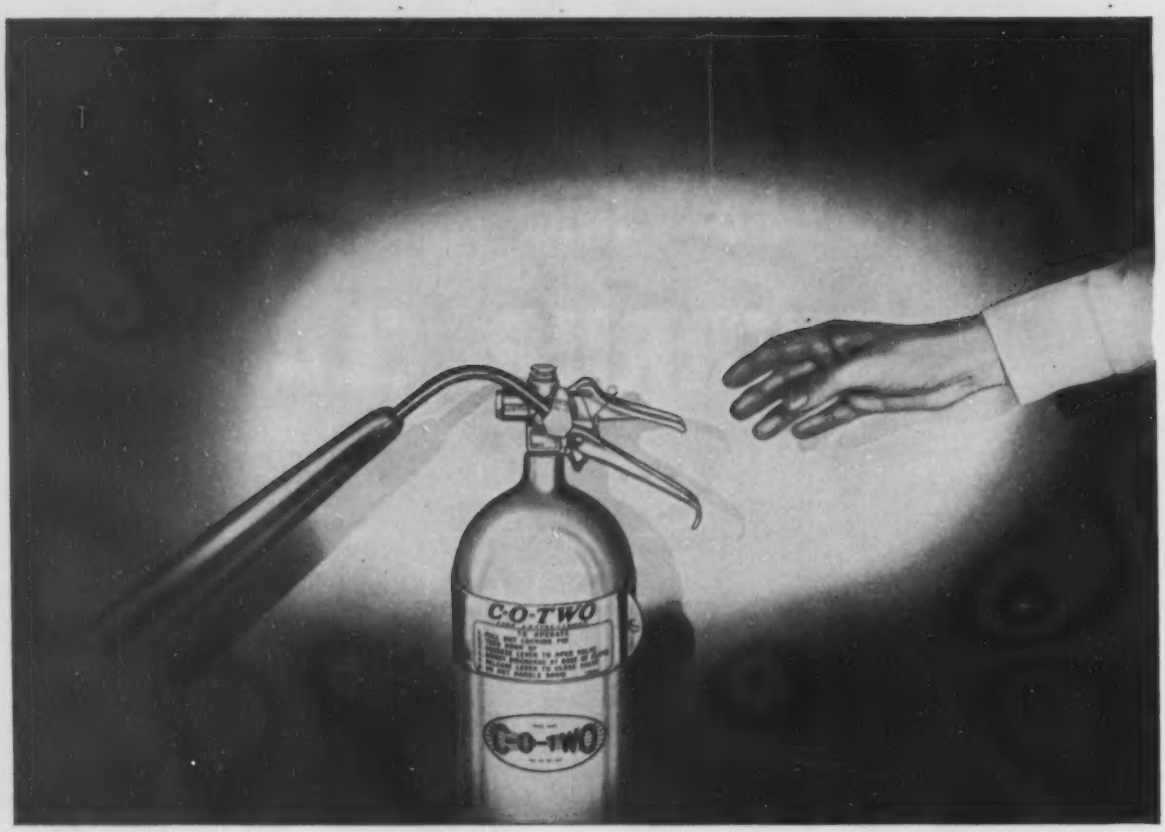
The heat-treated clamp body, cap and eye are high-strength cast aluminum alloy. Copper stirrup loops are serrated and compression-bonded into the clamps... **can't pull out!** Bolts are furnished with both flat and split washers. Hinge pins are stainless steel, and all other hardware parts are alumilite-finished high strength aluminum alloy.

FOR MORE COMPLETE INFORMATION consult your nearest ABW representative or contact our home office.

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES
for SUBSTATION • TRANSMISSION • DISTRIBUTION SYSTEMS *for over a Quarter Century*

ANDERSON BRASS WORKS, Inc.

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA



Handclasp of a friend-in-need

There's confidence in the very "feel" of the world famous C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers. The quick-acting "Squeez-Grip" fits your hand naturally like a handclasp... hangs right... carries right... works right. You're in complete command of the situation instantly... no fumbling... no fatigue.

From the non-conducting, shatterproof discharge horn to the high strength, durably finished cylinder, you get top quality construction that results in a lifetime of satisfactory service. Because of the very few working parts and corrosion resistant materials throughout, the total cost to you over the years is less than other initially lower priced makes... fire after fire, recharge after recharge, without trouble.

It's not hard to see, when you fully compare and try, why C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers are your best buy for killing flammable liquid and electrical fires, as well as some surface fires involving ordinary combustible materials. Sizes range all the way from 2½ to 100 pounds capacity... all fully approved by the Underwriters' Laboratories, Inc., Factory Mutual Laboratories, Armed Forces and Government Bureaus.

With C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers the penetrating carbon dioxide is a clean, dry, non-damaging, non-conducting, inert gas... smothers fire instantly, leaves no after fire mess... harmless to equipment, materials and finishes... even food is still perfectly edible.

Act now for complete free information on these first-rate, sure-acting fire extinguishers. Remember fire doesn't wait ...get the facts today!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

Copperweld TRADE MARK CONDUCTORS and GUYS

"—a major factor in providing better service at minimum cost"

Says Mr. HARRY METTENDORFF, Superintendent
Board of Public Utilities, Westfield, N. Y.

Read Mr. Mettendorff's letter. It's typical of the dependable performance reported by thousands of Copperweld* users.

And if you, too, want overhead lines designed to produce revenue at lowest cost per year, use Copperweld. This far-sighted engineering pays off in long life, trouble-free electrical connections, and rugged strength to withstand severe weather conditions.

*Trade Mark

BOARD MEETINGS 1ST AND 3RD TUESDAYS

THE VILLAGE OF WESTFIELD
WESTFIELD, NEW YORK

Copperweld Steel Company
Glassport, Pa.

Gentlemen:

We began using Copperweld conductors over thirty years ago when we first started extending our lines beyond the village limits. We are more than satisfied with their exceptional performance and economy.

Today, we serve the entire township, using many miles of Copperweld. We have found we need relatively few poles per mile and Copperweld has plenty of strength for storm loadings. The conductivity is good and maintenance costs are practically negligible. Even after more than 30 years' service, our original Copperweld conductors are still in good condition.

The extensive operating data we have accumulated shows that Copperweld has been a major factor in helping us provide, at minimum cost, the type of electric service that is an asset to our community.

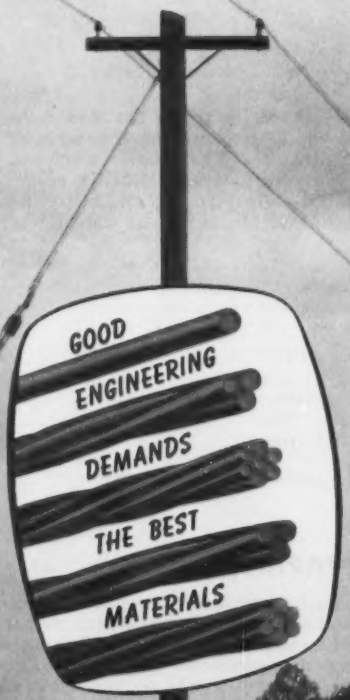
Sincerely,

Harry Mettendorff

Harry Mettendorff
Superintendent

HM:re

P. S. Because our guy replacements were costing us too much, we started using Copperweld strand about fifteen years ago. We are happy to report it has not been necessary to replace any of these Copperweld guys.



COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION
Glassport, Pa.
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

GET THESE 4 BIG PLUSSES WITH PREFORMED ACCESSORIES

Since the inception of electrical transmission, many diversified devices have been designed and used on conductors and strand for dead-ending, guying, splicing, repairing and amoring. But until the Preformed Rod* was invented, there was no ONE principal way of doing all these jobs simply, easily and without tools. In addition, Preformed Accessories assure these FOUR BIG PLUSSES over ordinary accessories:

1 QUICKER INSTALLATION:

Preformed Accessories are quickly and easily applied by hand. No tools, clamps, clips, bolts or nuts are required. For example, field records of one large Western Utility show that dead-ending guys the Preformed way saves approximately 50% in labor . . . saves at least 20% in material.

2 "VELVET-GLOVE" GRIP:

Only Preformed Accessories assure the maximum in large-area, low-radial-pressure contacts without any concentrated pressures. These devices are not compression fittings; their PREFORMED spiral pitches tightly and snugly grip the conductor or strand with a UNIFORM lasting fit that never loosens.

3 LONGER CONDUCTOR LIFE:

Preformed Accessories banish lightning pitting or arc-over of conductors at or near support points . . . substantially reduce conductor stress to minimize vibration fatigue . . . prevent wear by chafing or fretting. Preformed Accessories assure the longest satisfactory transmission and distribution line life.

4 NEATER APPEARANCE:

Preformed Accessories are just as neat as the conductor or strand to which they are applied. In appearance, they are just another layer of the conductor or strand. Their smooth contour blends so well into the overall assembly that they can hardly be seen from a distance of a few feet.

PROGRESSIVE IDEAS . . . backed by EXTENSIVE RESEARCH and SOUND ENGINEERING insure the ultimate in FIELD PERFORMANCE

PREFORMED LINE PRODUCTS COMPANY

5349 ST. CLAIR AVENUE, CLEVELAND 3, OHIO

TELEPHONE CLEVELAND EXPRESS 1-3571

1

ARMOR RODS

are for reinforcing the conductor and protecting it from damage caused by vibration, chafing, arcover, concentrated clamp and tie-wire stresses, etc.

2

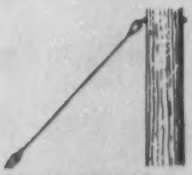
LINE GUARDS

of *Metal* protect conductors against clamping and tie-wire damage or arcover burning where vibration isn't a serious problem. Either metal or plastic Line Guards are ideal for protection of covered wires against abrasion.

3

"ALUMINUM-GRIP" DEAD-ENDS

make it easy to dead-end the bare-neutral or covered types of service drops both at the house and at the pole. These dead-ends assure low first cost, easy application and a neat appearance where it counts most.



4

PREFORMED "GUY-GRIPS"

assure the fastest, most economical and most efficient means of dead-ending guys . . . save about half the steel strand usually required . . . will not slip . . . are stronger than the strand itself.

5

PATCH RODS

are designed to restore the strength and full conductance to aluminum and ACSR conductors where damage does not exceed 25% of the outer strand layer.

6

PREFORMED LINE SPLICES

average 40% more conductivity than the unbroken conductor and are stronger than the original conductor.

7

DEAD-ENDS

The legs of a PLP Dead-End, when wrapped around conductor or strand, either bare or covered, assure a gripping strength great enough to break the strand or conductor without slippage.

8

TAP ARMOR

These short lengths of Preformed Rods eliminate troublesome concentrations of stresses . . . prevent arcing damage to the conductor . . . and guard against loosening of the tapping clamp.

SALES REPRESENTATIVES

*Preformed Armor Rods are manufactured under Patent Nos. 2,275,019 and 2,587,521 . . . other patents pending.

C. B. Andersen Co., *Tulsa* • Bergstrom-Verbarg Co., *Minneapolis* • Vincent J. Brown Co., *Buffalo* • Burns Electric Co., *Pittsburgh* • Earl S. Condon Co., *Los Angeles* • Cory and Crum, *Indianapolis* • The Electrical Distributors Co., *Philadelphia* • Engineer Sales Co., *St. Petersburg* JSG Electric Co., *Chicago* • E. L. Flowers, *Boston* • George R. Horne & Co., *Dearborn* • Johnson Sales Co., *Bay City* • H. L. Macon & Co., *Atlanta*, Peterson Co., *Denver* • Elgin B. Robertson, Inc., *Dallas* • Elgin B. Robertson Co., *Houston* • K. M. Ryals Co., *San Francisco* • Shaffer and Nelson, *Portland, Seattle, Spokane* • M. H. Snyder & Sons, *New York* • Curtis H. Stout, *Little Rock, Memphis, New Orleans* • L. G. Wondegatz, *Kansas City*

BE THE JUDGE

and the Jury, too...

consider the **FACTS**

about BROWN BOVERI TURBO-GENERATORS

weigh the evidence

FACT NO. 1 TOP EFFICIENCY

FACT NO. 2 MINIMUM MAINTENANCE

FACT NO. 3 LONG LIFE

FACT NO. 4 LOW INITIAL COST

FACT NO. 5 THOROUGH DEPENDABILITY

FACT NO. 6 PROMPT DELIVERY

FACT NO. 7 MODERN, COMPACT DESIGN

FACT NO. 8 COMPLETE SERVICE FACILITIES

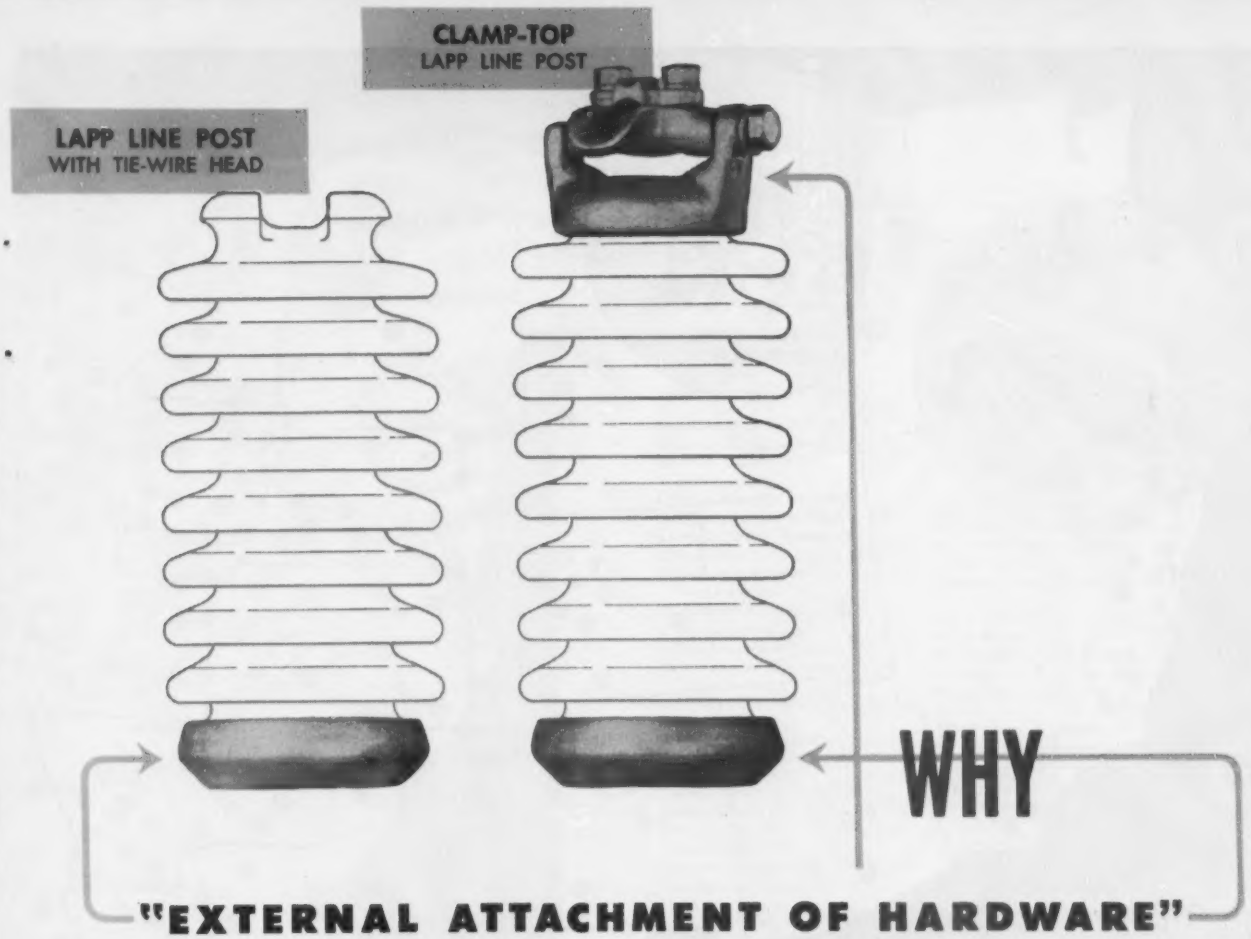
These facts apply to Brown Boveri Turbo-generators . . . plus, of course, world-famous Brown Boveri quality. The verdict, on the basis of facts, is—Brown Boveri is the "buy". That's why astute cost- and quality-conscious industrials, utilities and cooperatives specify Brown Boveri. It will pay you to get more details about these Turbo-generators.

BROWN BOVERI

BROWN BOVERI CORPORATION

19 RECTOR STREET • NEW YORK 6, N. Y.

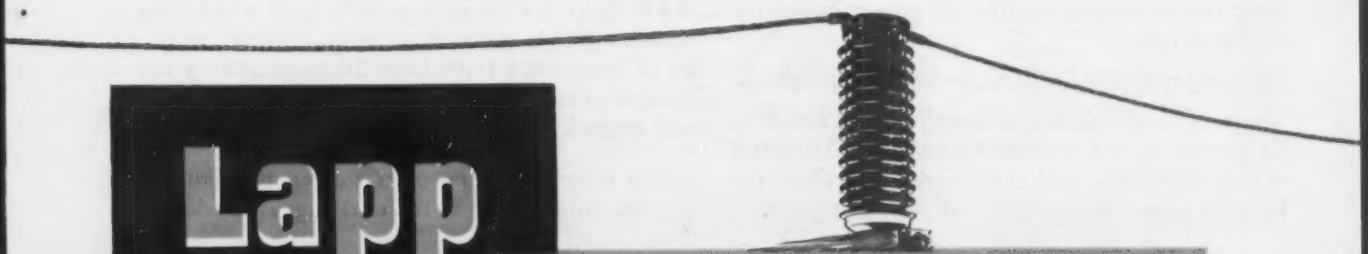
SALES OFFICES Atlanta, Ga. • Birmingham, Ala. • Boston, Mass. • Butte, Mont. • Chicago, Ill. • Cleveland, O. Denver, Colo. • Detroit, Mich. • High Point, N. C. • Jacksonville, Fla. • Kansas City, Mo. Knoxville, Tenn. • Lewiston, Me. • Los Angeles, Cal. • Minneapolis, Minn. • New Orleans, La. New York, N. Y. • Portland, Ore. • San Francisco, Cal. • Seattle, Wash. • Tucson, Ariz.



"EXTERNAL ATTACHMENT OF HARDWARE"

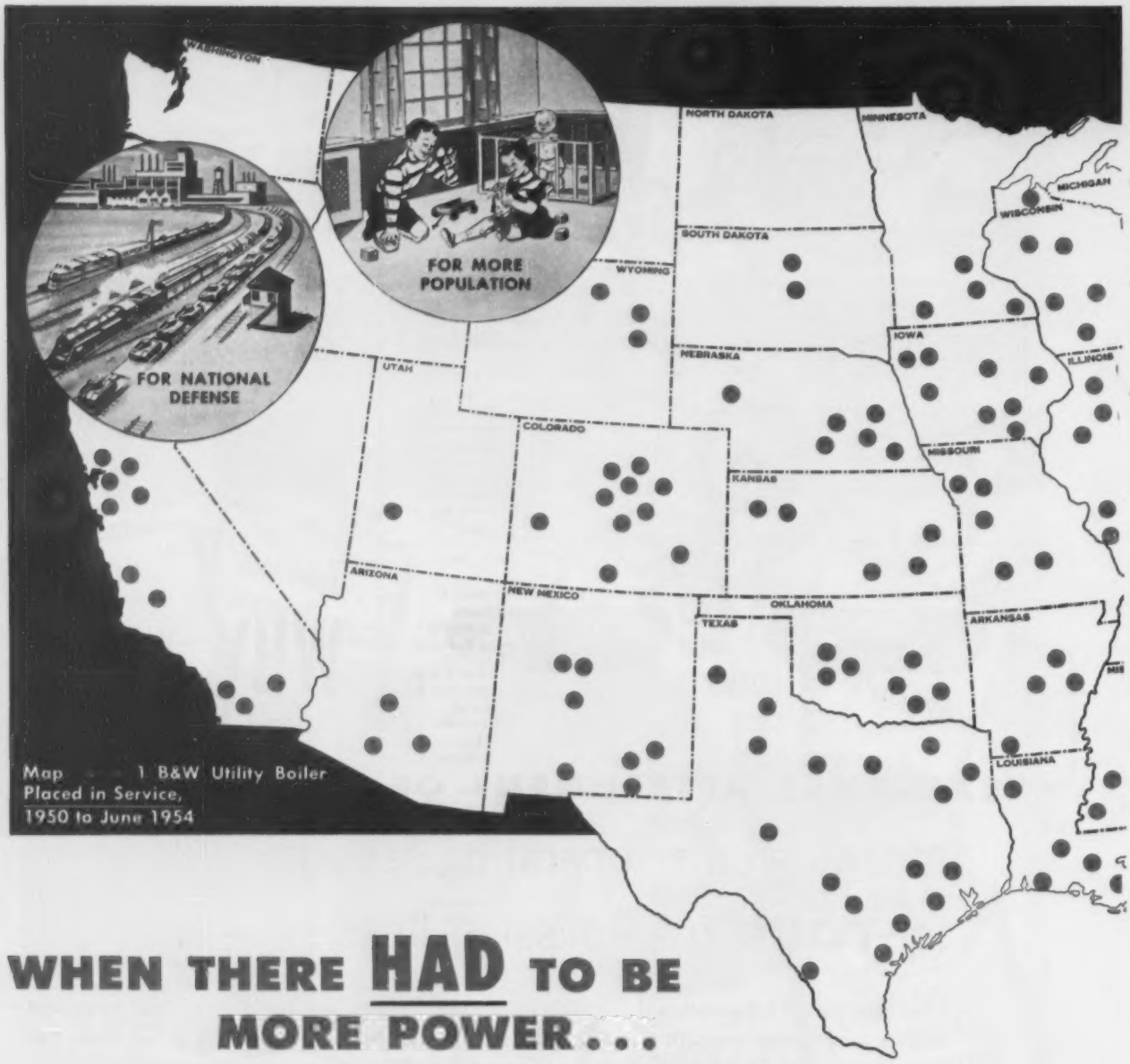
means greater operating security for **YOUR** transmission lines

Characteristics of Lapp electrical porcelain include a compression strength of 100,000 lbs., a tensile strength of 5,000-8,000 lbs. Lapp Line Posts are designed to utilize the greatly superior compression strength, by *external attachment of hardware.* No nested porcelain parts . . . no pins . . . no inserts . . . no bursting forces . . . no small-area high-intensity tension loading of porcelain under thermal movement or mechanical loading. Instead, the large-area gentle-grip of externally attached bases and caps. This is the design which depends on the *compression* strength of *porcelain,* and the tension strength of steel. It's a fundamental in the Lapp concept of better insulator design. It is one of the ways Lapp builds transmission insulators to give you an extra margin of operating security, long life, and low upkeep.



Lapp

LAPP INSULATOR CO., INC., LE ROY, NEW YORK



WHEN THERE HAD TO BE MORE POWER...

America's Electric Utilities Rose to

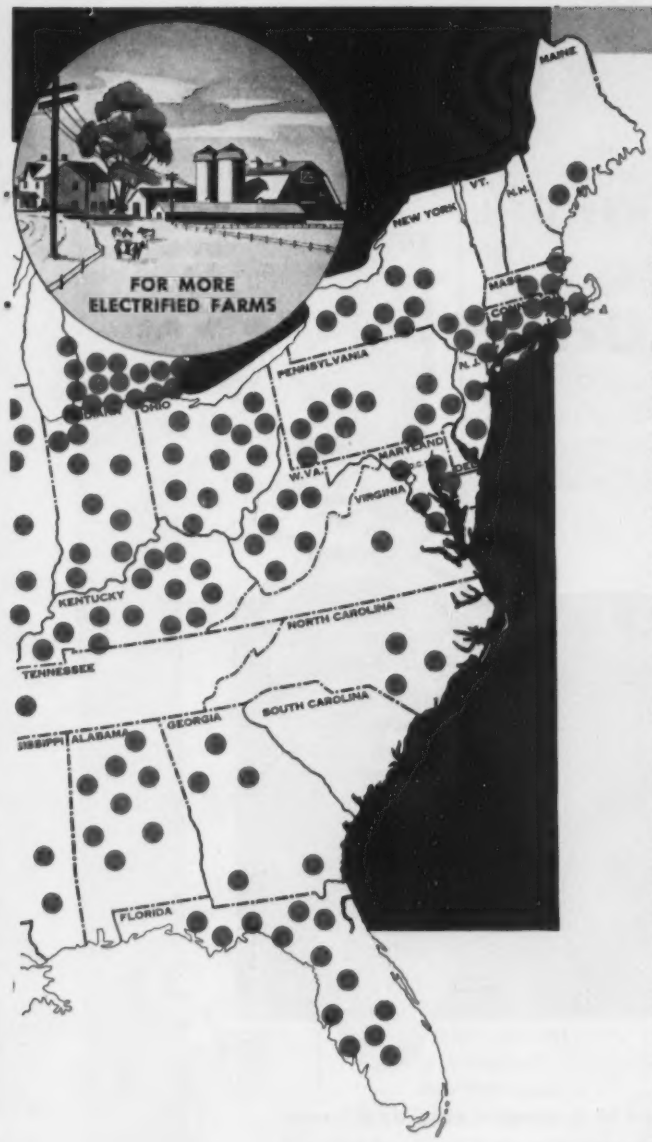
When the drums rolled for Korea in 1950, America's electric utilities were confronted, overnight, with a tremendous demand for more power. Vastly expanded production needed for war, the requirements of a fast-growing population, and continuation of the nationwide farm electrification program, all demanded power in greater quantities than ever before.

And the power that had to be produced was produced.

The magnitude of this accomplishment can best be gauged by the estimated number of kilowatts —29,500,000*—added to the nation's service lines by both steam and hydro in the past four years.

To help supply boilers for this additional power, B&W doubled its own manufacturing capacity and, as a glance at the map will show, was responsible during this period alone, for putting on the line more than 250 individual steam generating units in utility power plants across the country. These B&W Boilers alone have a capacity of more than 110,000,000 lb of steam per hour, serving a capacity of better than 13,000,000 kilowatts and a great number of additional units are still being fabricated and erected.

When there *had* to be more power, the nation's electric utilities rose to the challenge... made ad-



the Challenge

ditional kilowatts available when and where they were needed. As it has done since the very first days of the power industry, B&W will continue its close cooperation with America's electric companies to help them meet the future demands of their great responsibility. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

*Source: Edison Electric Institute

BABCOCK & WILCOX
BOILER DIVISION

MORE THAN 250 B&W BOILERS were put in service by these Utilities — 1950 to June 1954

Alabama Power Co.
Appalachian Elec. Pwr. Co.
Arkansas Power & Light Co.

Black Hills Power & Light Co.
Braintree, Mass. Electric Light Dept.
Burbank, Calif., City of

Carolina Power & Light Co.
Celina, O., Village of
Central Illinois Public Service Co.
Central Kansas Power Co.
Central Louisiana Electric Co.
Central Maine Power Co.
Central Power & Light Co.(Texas)
City Public Service Board, San Antonio, Tex.
Cleveland Electric Illuminating Co.
Commonwealth Edison Co.
Consolidated Edison Co. of N. Y. Inc.
Con. Gas Elec. Lt. & Pwr. Co. of Baltimore
Consumers Power Co.
Consumers Public Power Dist.

Dallas Power & Light Co.
Derby, Conn. Gas & Electric Co.
Detroit, City of
Detroit Edison Co.
Duquesne Light Co.
Dyersburg, Tenn., City of

East Palestine, O., City of
Eastern Shore Public Service Co.
El Paso Electric Co.
Ephrata, Pa., Borough of

Florida Power Corp.

Georgia Power Co.
Glendale, Calif., City of
Grand Island, Neb., City of
Gulf Power Co.

Hartford Electric Light Co.
Henderson, Ky., City of
Herkimer, City of
Houston Lighting & Power Co.
Huntingburg, Ind., City of

Imperial Irrigation Dist.
Independence, Mo., City of
Indiana & Michigan Electric Co.
Indianapolis Power & Light Co.
Iola, Kan., City of
Iowa Electric Light & Power Co.
Iowa Power & Light Co.
Iowa Public Service Co.
Iowa-Southern Utilities Co.

Jacksonville, Fla., City of
Jersey Central Power & Light Co.

Kansas City, City of
Kentucky Utilities Co.
Kinston, N. C., City of

Lafayette, La., City of
Lake Superior District Power Co.
Lakeland, Fla., City of
Lansing, Mich., City of
Loup River Public Power Dist.

Mississippi Power Co.
Mississippi Power & Light Co.
Mississippi Valley Public Service Co.
Missouri Public Service Co.
Monongahela Power Company
Montana-Dakota Utilities Co.

Narragansett Electric Co.
New England Power Co.
New Orleans Public Service Co.
New York City Board of Transportation
New York State Elec. & Gas Corp.
Niagara-Mohawk Power Corp.
Northern Indiana Public Service Co.
Northern States Power Co.

Ohio Edison Co.
Ohio Power Co.
Oklahoma Gas & Electric Co.
Omaha Public Power Dist.
Owensboro, Ky., City of

Pacific Gas & Electric Co.
Pennsylvania Electric Co.
Pennsylvania Power Co.
Philadelphia Electric Co.
Public Service Co. of Colorado
Public Service Co. of New Mexico
Public Service Co. of No. Illinois
Public Service Co. of Oklahoma
P. S. Div. of Commonwealth Ed. Co.

Reading, O., City of
Rockland Light & Power Co.

St. Joseph Light & Power Co.
Salt River Power District
San Diego Gas & Electric Co.
Southern Colorado Power Co.
Southern Indiana Gas & Electric Co.
Southern Utah Power Co.
Southwestern Gas & Electric Co.
Southwestern Public Service Co.

Tallahassee, Fla., City of
Tampa Electric Co.
Taunton, Mass. Municipal Lighting Plant
Tennessee Valley Authority
Texas Electric Service Co.
Texas Power & Light Co.
Thomasville, Ga., City of
Toledo Edison Company
Troy, O., City of
Tucson Gas, Elec. Lt. & Pwr. Co.

Union Electric Co. of Missouri
United Illuminating Co.

Vineland, N. J., City of
Virginia Electric & Power Co.

Wellington, Kan., City of
West Penn Power Co.
West Texas Utilities Co.
Wilson, N. C., Town of
Wisconsin Power & Light Co.
Wisconsin Public Service Corp.
Worthington, Minn., City of
Wyandotte, Mich., City of

G-658

protect your cable ends with

G&W potheads

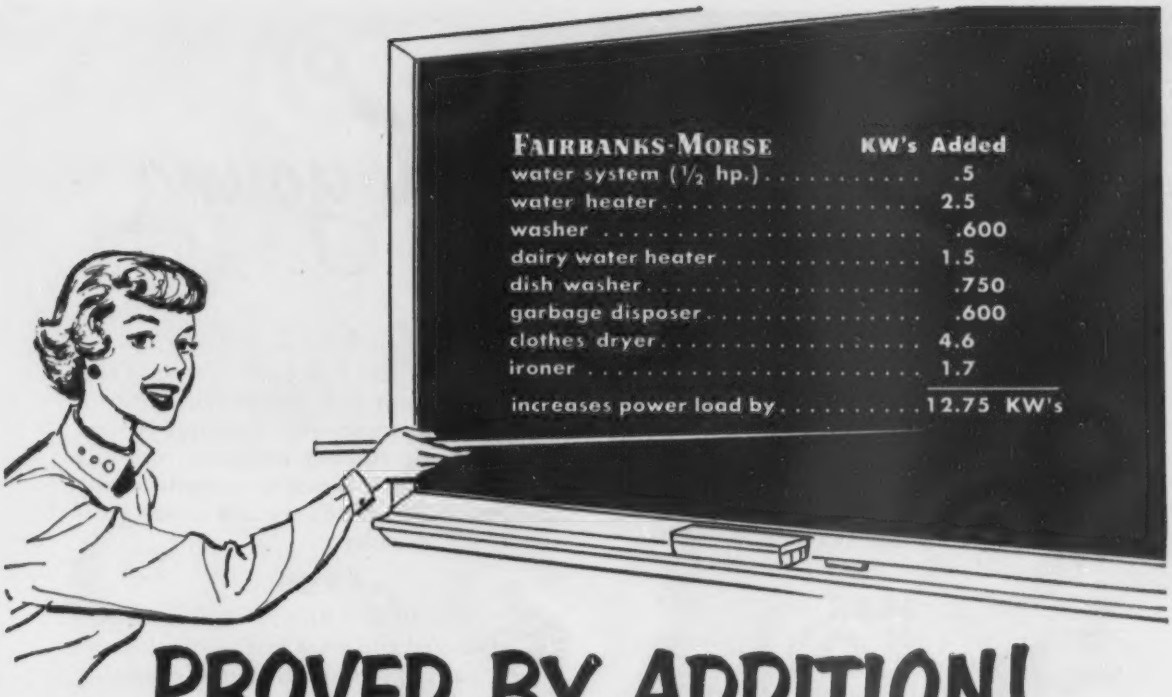
There is a proper size and form for every size and type of cable!

Simple basic design details of G & W potheads, proven by years of satisfactory service, help provide trouble-free operation of cable circuits.

G&W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois
Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

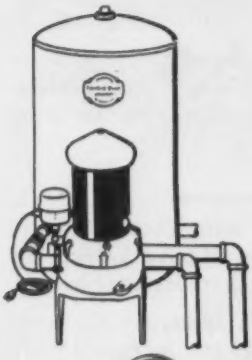
G&W

A544



PROVED BY ADDITION!

FAIRBANKS-MORSE Water Systems BUILD POWER LOAD



Every time a FAIRBANKS-MORSE electric water system is installed, the KW load starts climbing.

Load-building appliances which could not be enjoyed until running water became available are bought as quickly as possible.

A water heater for the home, and another for the milk house or dairy usually come first. A modern washing machine soon follows, and with it may come the need for a dryer and an ironer.

Running water opens the way also for sales of dishwashers and garbage disposal units; for stock water tank heaters and waterers; for pipe thawers and can washers . . . all load builders!

FAIRBANKS-MORSE

a name worth remembering when you want the best

WATER SYSTEMS • GENERATING SETS • MOWERS • HAMMER MILLS • PUMPS
MAGNETOS • MOTORS • SCALES • DIESEL LOCOMOTIVES and ENGINES

what you ought to know about our water systems

Since electric water systems are *big* factors in helping you build up power loads, you ought to know all about them. So we've thought of ways to help you. We will supply you with educational wall charts on shallow well and deep well pumps; charts on plumbing hook-ups and sewage disposal layouts for average houses; booklets showing types of pumps, their capacities and uses.

Fairbanks, Morse & Co.
600 S. Michigan Ave., Chicago 5, Ill.

Please send a representative to show us how to use your wall charts and interpret your literature on home water systems.

Company Name .....

Your Name .....

Address .....

City ..... State .....

81 years ~~old~~ young

Age in itself means very little. But age accompanied by historic achievements and age that is continuing to produce the finest products of their type is something of which we are proud.

1873

Founded in 1873, The R. Thomas and Sons Company very early became closely allied to the electrical industry.

1885

In 1885, the first "Thomas Quality" insulator was produced, the first shipment going to the U.S. Electric Lighting Co., Chicago.

1893

In 1893, all of the porcelains used in the lighting arrangement for the World's Fair at Chicago, installed by Westinghouse, were Thomas.

1896

In 1896, Thomas perfected the first multi-part, high-voltage, pin-type insulator. It was known as the "Boch" Glaze-Filled Insulator, later to be patented under No. 600,475. It represented the initial step toward making possible the transmission of electrical energy at higher voltages.

1907

In 1907, Thomas designed and made the first cap-and-pin suspension insulator. Units installed that year are still giving trouble-proof service after 46 years of continuous operation.

1917

In 1917, we introduced the Thomas link-type Hewlett suspension insulators. Insulator failure being virtually unknown with this design, it is easy to understand why hundreds of thousands are still giving satisfactory service today.

1938

In 1938, Thomas engineers pioneered and were first to develop the under-glaze metallic oxide coating that guarantees the "noise-free" operation of the patented Thomas "Q-T" Insulators. (Patent No. 2154387)

1953

In 1953, Thomas developed a new petticoat design in the 10-inch suspension insulator that positively prevents chipping or breaking of inner petticoats.

These are among the many Thomas "Firsts" and contributions which have helped the Electrical Industry reach its present position.

TODAY, in our 81st year, we are ready with improved facilities and increased capacity to meet the most exacting needs of the Industry. After all is said, it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Why gamble?

The R. Thomas and Sons Co.

LISBON, OHIO

NEW YORK CHICAGO

1873 THOMAS INSULATORS our 81st year RELIABILITY 1954

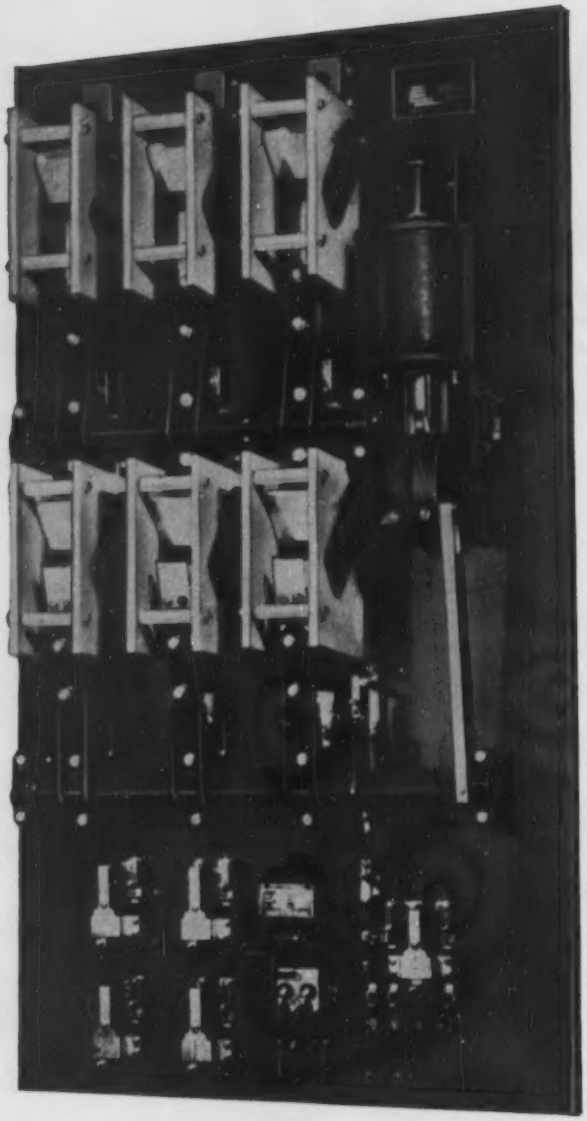
Sales Representatives: C. G. Anderson, *Chicago* • E. B. Anderson Co., *Detroit* • Conrad R. Bangh, *Omaha* • Ken H. Best, *Seattle* • Nellis B. Bronner, Jr., *Syracuse* • R. E. Cunningham & Son, *Los Angeles* • W. H. Eddy Electric Products, Inc., *Phoenix* • Engineer Sales Co., *St. Petersburg* Electrical Distributors Co., *Philadelphia* • Hamilton Associates, *Denver* • Geo. E. Henn Co., *San Francisco* • Hugo Sales Co., *Minneapolis* • J. P. Lane Co., *St. Louis* • John G. Pettijohn Co., *Knoxville* • H. E. Ransford Co., *Pittsburgh* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan Co., *Boston* Tafel Electric & Supply Co., *Louisville* • Walter E. Thompson Co., *Birmingham* • Triangle Electric Supply Co., *El Paso* • United Electric Supply Co., *Salt Lake City* • Williamson Sales Co., *Shreveport, Amarillo, Corpus Christi, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities*

1954
Thomas QUALITY
INSULATORS AND
ACCESSORY HARDWARE

K&M

Asbestos Products

for electrical applications



Automatic Transfer Switch, manufactured by Automatic Switch Co., Orange, N. J.

This switch makes use of two reliable K&M electrical materials: K&M Ebonized Asbestos for the panelboard, and K&M Monobestos for the arc shields.

Ebonized Asbestos is an ideal electrical insulating material composed of asbestos fiber and portland cement. It is molded under pressure into sheet form and impregnated with an asphaltic compound to give it very high dielectric strength. It is strong, light in weight, of uniform density, and withstands vibration and shock.

Monobestos, made of asbestos fiber and portland cement, is a durable, readily workable sheet material having high resistance to arc and fire.

In addition to these materials, K&M makes cold molded asbestos parts to specification and Asbestos Cloth, Tapes and Tubing for electrical equipment. Write for details on any of these products.

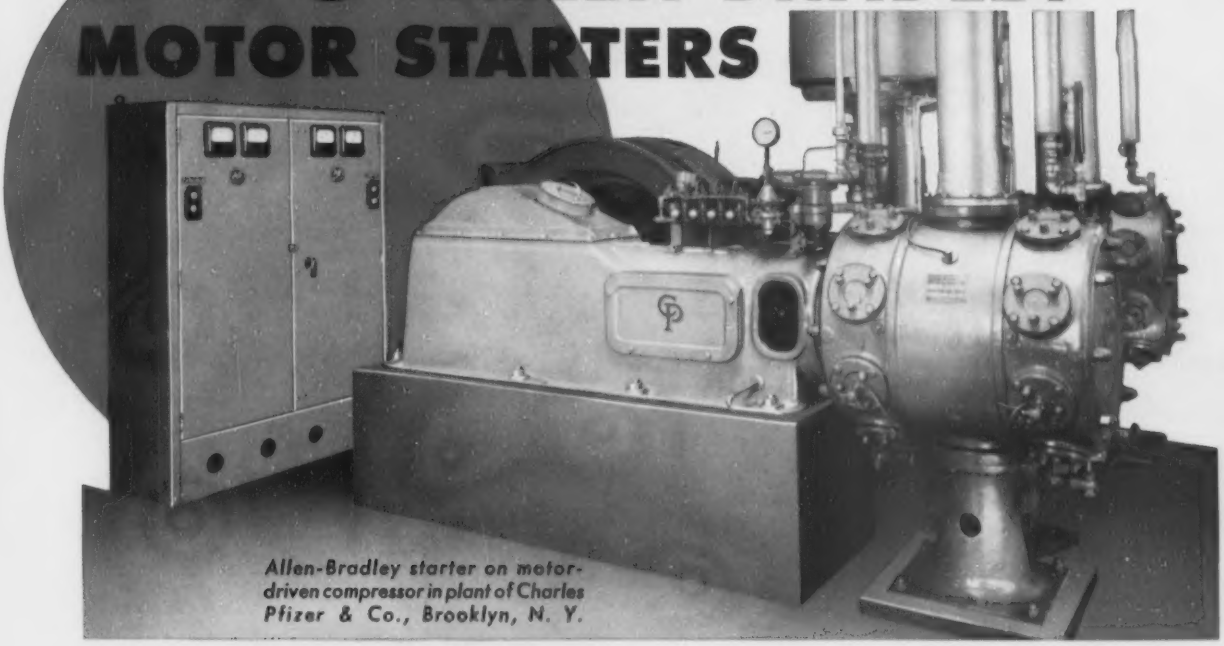
KEASBEY & MATTISON COMPANY • AMBLER • PENNSYLVANIA

Nature made asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

In Canada: Atlas Asbestos Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

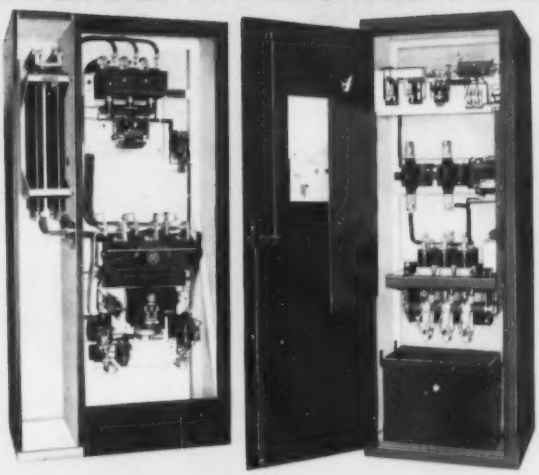
K&M Best in Asbestos

BIG ALLEN-BRADLEY MOTOR STARTERS



Allen-Bradley starter on motor-driven compressor in plant of Charles Pfizer & Co., Brooklyn, N. Y.

Manual or Automatic Starters Up to 1500 HP-4600 V



Bulletin 740 Size 6 resistance starter with adjustable graphite disc compression resistors.

Bulletin 1109 high voltage across-the-line squirrel cage automatic motor starter. Has 3-pole oil immersed contactor.

Overload Protection—Two thermal relays provide reliable and accurate overload protection. Always accurate . . . always on the job.

Out-of-Step Relay—The squirrel cage winding of synchronous motors is provided for starting only, and is susceptible to injury through overheating if the motor operates at subsynchronous speed for more than the safe allowable starting time. An out-of-step relay is therefore provided on all A-B synchronous motor starters. The relay is a fluid dashpot type of time delay overload relay.

BIG MOTORS need dependable starters with trouble-free contactors, relays, and current limiting fuses or circuit breakers. To meet the demands of large motor-driven machines, Allen-Bradley has developed a line of 14 different types of across-the-line and reduced voltage starters . . . for motors up to 1500 hp.

Each type comes in a wide range of horsepower and voltage ratings . . . either manually or push button operated. Every big Allen-Bradley starter consists of time-tested components that have established their individual reputations for quality and trouble-free performance.

At maximum rating, these big starters have an interrupting capacity of 10 times motor full load current. These starters are designed to be self-protecting against short circuits up to 150,000 kva on 2000-2500 volts or 250,000 kva on 2501-4600 volts.

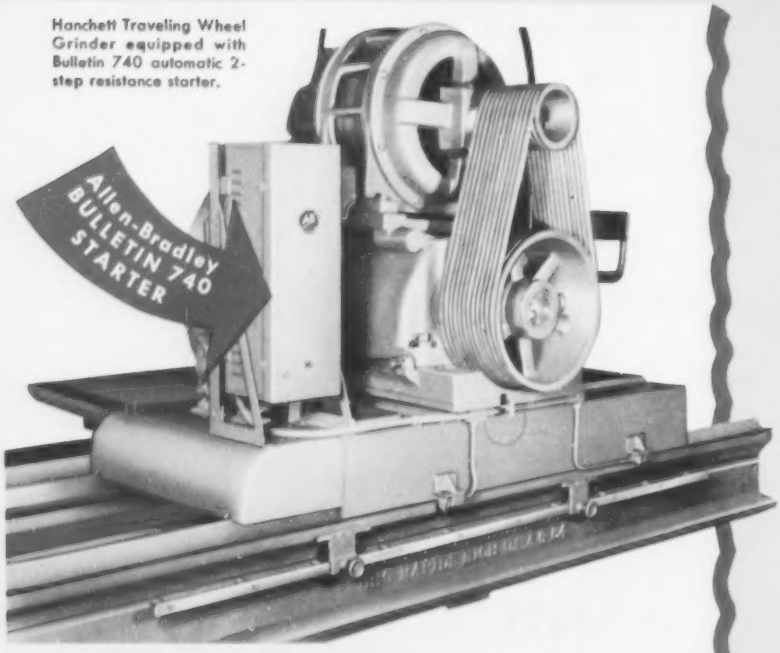
Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wisconsin

5-54-M

A-B

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

When You Need a Reduced Voltage Starter

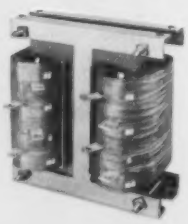


Hanchett Traveling Wheel Grinder equipped with Bulletin 740 automatic 2-step resistance starter.

Here Are 6 Allen-Bradley Starters . . . All Different

To satisfy the varied starting requirements where a reduced voltage starter is either necessary or desirable, 6 types of Allen-Bradley reduced voltage starters are listed here. They will start spinning frames, big presses with heavy flywheels, and chain or gear driven machines without jerk or jolt. For more complete data, please send for Allen-Bradley Handy Catalog—6th Edition.

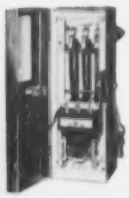
Rear view of Bulletin 640 manual compression resistance starter (removed from cabinet) showing 3 resistor tubes that are filled with graphite discs. Pressure is gradually applied on discs with hand lever which lowers the starting resistance until the motor and the machine accelerate with velvet smoothness.



Autotransformer with 50, 65, and 80% reduced voltage taps used in Bulletins 646 and 746 autotransformer type starters.

MANUAL—COMPRESSION TYPE

Manual compression resistance starter up to 200 hp, 220-440-550v. Graphite discs in the insulated tubes are compressed with the hand lever for stepless speed control. Ideal starters for chain or belt drives. Overload relay protection.



BULLETIN 640

MANUAL—TRANSFORMER TYPE

Manual transformer type starter up to 125 hp, 220v; 250 hp, 440-550v. Air break or oil immersed contacts. Automatic reset overload relays. Time delay mechanism determines proper time interval for manual switch-over of hand lever.

BULLETIN 646

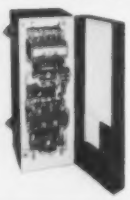
AUTOMATIC—TRANSFORMER TYPE

Automatic reduced voltage starter up to 300 hp, 220v; 600 hp, 440-550v. Timing relay controls the accelerating time. Operator touches Start button—the starter does the rest. Available in standard, watertight, and dusttight enclosures.

BULLETIN 746

AUTOMATIC—2&3 STEP COMPRESSION

Automatic resistance starter with preset adjustable graphite resistors up to 200 hp, 220-440-550v. Push button closes starting circuit through resistors. Later, timing relay closes running contactor and cuts out the starting resistors.



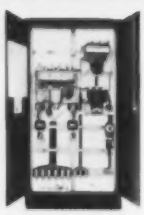
BULLETIN 740

AUTOMATIC—STEPLESS TYPE

Fully automatic resistance starter with solenoid controlled graphite disc resistors up to 300 hp, 220v; 600 hp, 440-550v. Stepless control of current and speed. Acceleration adjustable to avoid lamp flicker. Overload relay protection.

BULLETIN 742

AUTOMATIC—MULTI-POINT



Automatic resistance starter up to 300 hp, 220v; 600 hp, 440-550v. Resistors easily adjusted for ideal starting of motors on power networks. For more than 4-point control, use Bulletin 742 starter.

BULLETIN 741

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.

ALLEN-BRADLEY
REDUCED VOLTAGE STARTERS
QUALITY

5-54-M

NEED 450 MC EQUIPMENT? INSIST ON G-E's

"Performance Guarantee"

2-WAY MOBILE RADIO

SELECTIVITY GUARANTEED FOR LIFE

SELECTIVITY GUARANTEED FOR LIFE. New multi-coil IF transformers. Compare G-E specs with any other.
HIGH-Q CAVITIES at both receiver input and transmitter output—your best insurance against TV interference!
290 KC LOW IF—the right IF for mobile radio equipment!
RESERVE POWER at the station—40 watts output on all station equipment—continuous duty rating!
FULL 6/12 VOLT OPERATION. Mobile unit functions from 6 or 12 volt source!
4-CHANNEL OPERATION . . . Here's positive assurance of performance on different frequencies!

IT's new in every meaning of the word! Each feature of this 450 MC 2-way radio indicates advanced engineering design . . . fulfills all the performance factors you expect from superior mobile communications equipment. The complete value is best appraised by General Electric's confident warranty . . . *Selectivity Guaranteed For Life!*

Any decision to buy 2-way radio equipment must include a careful examination of the new G-E 450 unit. Make this examination and *you'll* become a well-satisfied G-E user. Take the first step . . . the right step . . . *today!* Call our local G-E Communications Counsellor or write: *Section X5364, General Electric Co., Electronics Park, Syracuse, N. Y.*

GENERAL ELECTRIC

NOW! **You get General Electric's guarantee policy when you purchase any new G-E 2-way radio . . . regardless of type!**

General Electric Company, Section X1964-14
Electronics Park, Syracuse, New York

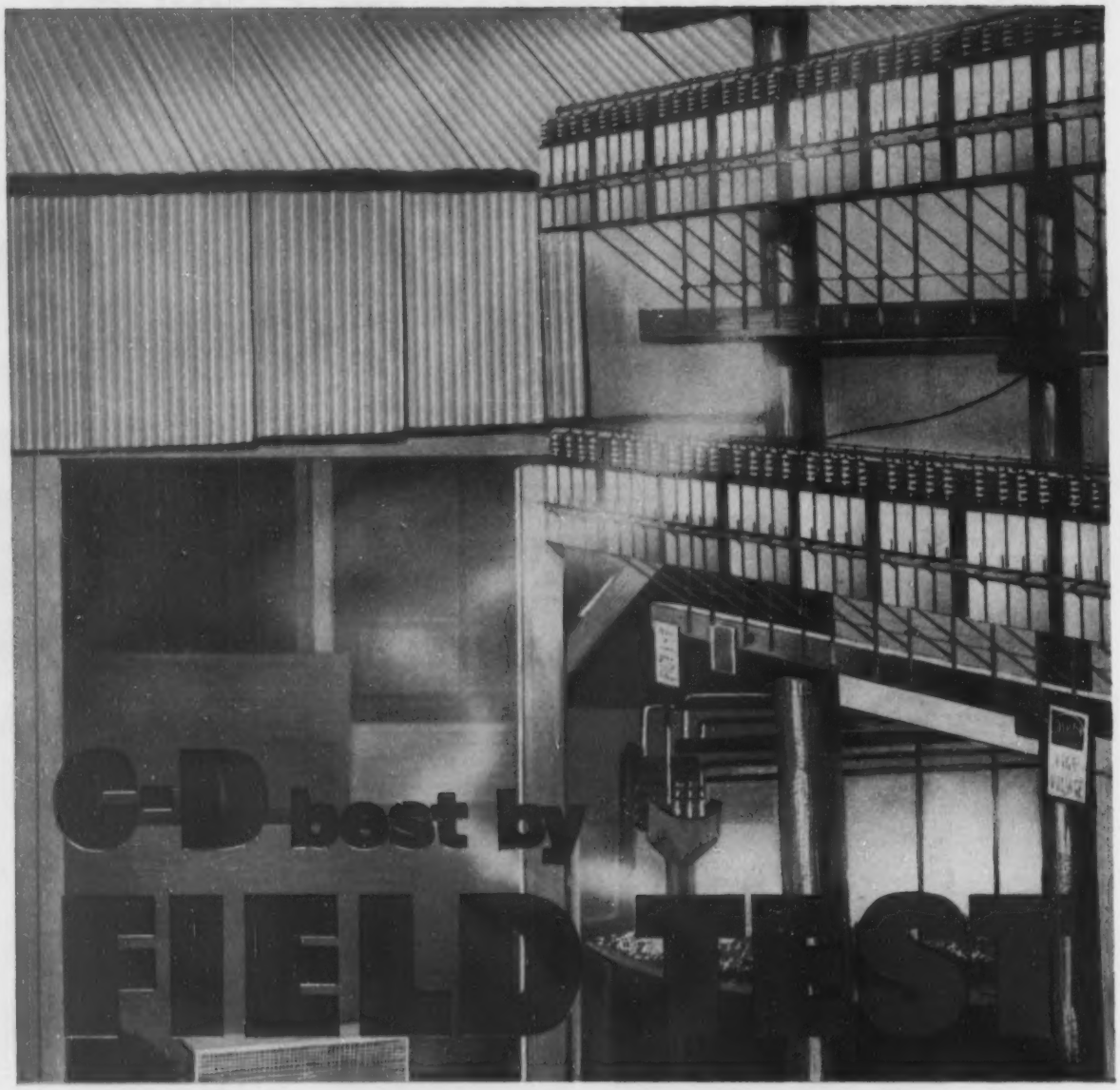
I want to know more about the G-E 450 MC 2-way radio . . . more about G-E's GUARANTEE!

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....



This southeastern C-D capacitor installation is situated at the entrance to a large metallurgical smelter. Furnace temperatures run well over 3,000°F and the fumes are acidic. As a result these C-D capacitors are exposed to excessive temperatures and acid fumes that create a conducting electrolytic path leading to leakage and lower arc resistance of major bushing insulation. Yet, these C-D capacitors have given trouble-free service year after year, with little or no maintenance! It's another example of how C-D's superior engineering design that builds an extra margin of safety into each and every capacitor, pays off in the field year after year.

A C-D engineer can save you important maintenance dollars on your next power-factor installation. It will pay you to talk over your power-factor problems with him. No obligation, of course.

Cornell-Dubilier Electric Corporation, Dept. D-64, South Plainfield, N. J.

There are more C-D capacitors in use today than any other make

CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER CAPACITORS

FOR POWER-FACTOR IMPROVEMENT

PLANTS IN SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS.; PROVIDENCE AND HOPE VALLEY, R. I.; INDIANAPOLIS, IND.; SANFORD AND FUQUAY SPRINGS, N. C.; SUBSIDIARY: THE RADART CORPORATION, CLEVELAND, O.

TIMKEN CONNECTS WITH CADWELD

THE TIMKEN ROLLER BEARING COMPANY of Canton, Ohio, used CADWELD electrical connections on the installation of their new power panel. 1000 MCM cables were CADWELDED to ⅜ x 2" offset lugs. The panel controls a 2000 H.P. constant potential DC motor driving the Assel Elongator Mill. The upper cables lead to the main DC supply bus while those at the bottom go direct to the 2000 H.P. Motor.

CADWELD connections were used for four main reasons:

1. They cannot loosen or corrode.
2. They have a greater current carrying capacity than the cable itself.
3. They are small in outside diameter and meet the space limitation requirements.
4. The equipment necessary to make the CADWELD connections is portable, therefore connections could be made at final assembly point.

***For the best in* ELECTRICAL CONNECTIONS**

ERICO PRODUCTS, INC.
2070 E. 61 St. PLACE — CLEVELAND 3, OHIO

☐ Send Descriptive Literature on CADWELD Electrical Connections

☐ Have Representative Call

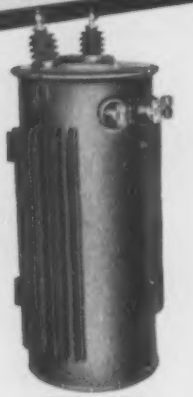
NAME _____ POSITION _____

COMPANY _____

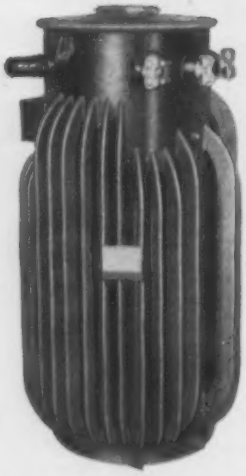
ADDRESS _____

CITY _____ ZONE _____ STATE _____

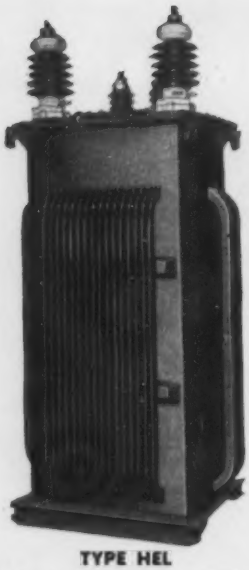
Wagner®
TRANSFORMERS
...the choice of leaders in industry



TYPE HEK
Single-phase 50 kva, 12000 to 120/420 volt transformer shown.



TYPE HEB
Single-phase 100 kva, 2400/4160Y to 120/240 volt transformer shown.



TYPE HEL
Single-phase 333 kva, 34400 to 7200 volt transformer shown.

choose Wagner

they meet all NEW EEI-NEMA Standards

The Wagner line of Distribution Transformers will meet your requirements no matter how varied they may be. The line includes *every rating and design* listed in the E. E. I.—NEMA *Fifth Report*.

When you choose WAGNER, you get all the standardized electrical and mechanical features that assure quick, easy installation and greater convenience in handling and maintenance. You get full Wagner Quality—the kind of quality that pays dividends in years of extra service. You get the benefit of improved design, better performance and longer transformer life.

You get quick delivery, too. Wagner's expansion program has provided a new plant, devoted exclusively to the manufacture of transformers, to help meet the growing demand for Wagner Transformers. And—in addition, Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities.

Get in touch with your nearby Wagner branch today. Write for your copy of Bulletin TU-180. It gives complete information on Wagner Distribution Transformers.

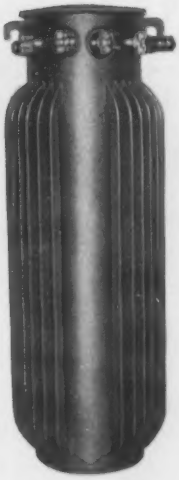
Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Avenue • St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

TYPE HPK
Three-phase 225 kva, 7200 to 240 x 480 volt transformer shown.

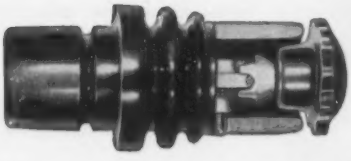


TYPE HPB (Vertical)
Three-phase 112.5 kva, 2400 to 208Y/120 volt transformer shown.

TYPE HPB
Three-phase 75 kva, 2400 to 240 x 480 volt transformer shown.

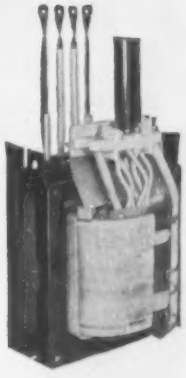
Distribution Transformers

...and offer these EXTRA features, too!

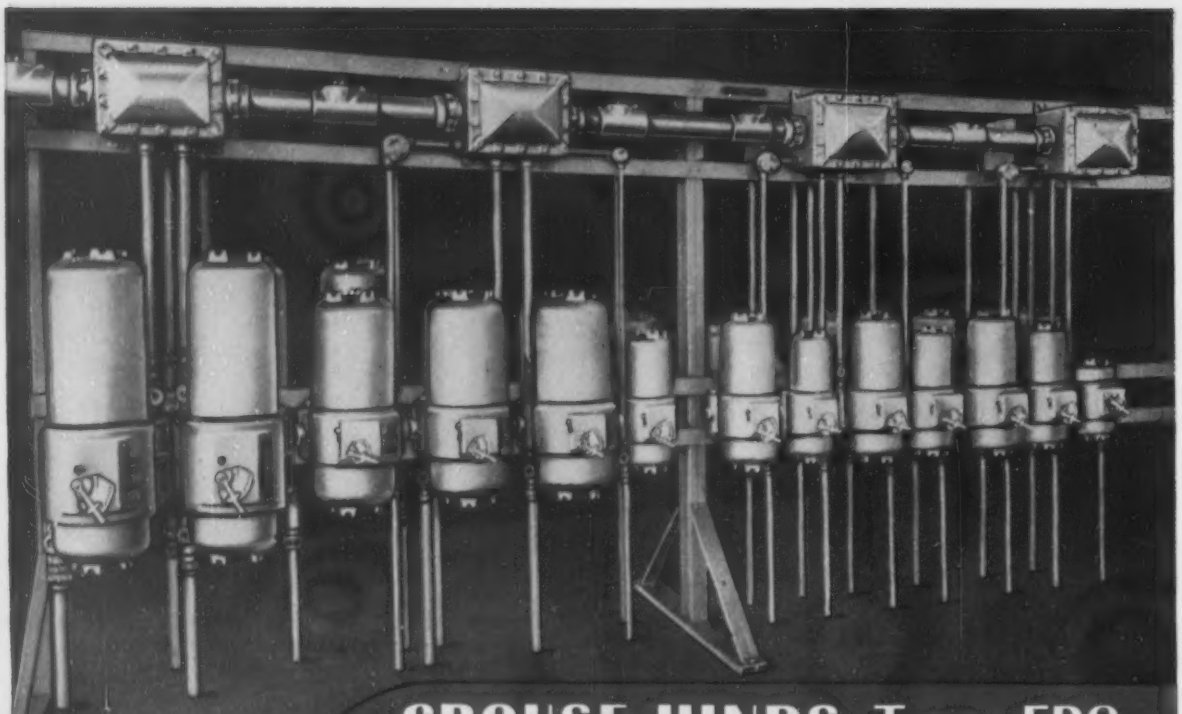


The high voltage sidewall bushings used on Wagner Distribution Transformers permit faster, easier, safer permanent connections. The conductor slips into the connector—no special tools are needed. The connector is then tightened by a few turns of the insulated finger-grip knob.

All Wagner pole-type transformers in round tanks have covers sealed to the tank with the Wagner SHUR-SEAL Clamping Ring that prevents "breathing" and gives true sealed-tank construction. Wagner Distribution Transformers are filled with inhibited oil to reduce oxidation and retard the formation of acids and sludge.



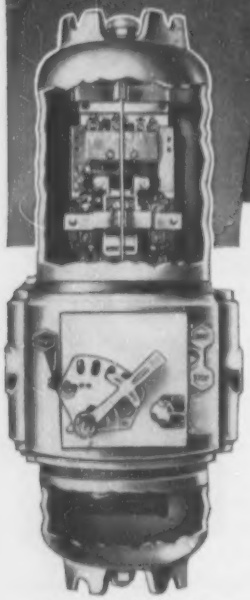
All Wagner pole-type single-phase transformers in ratings 167 kva and below are furnished with Wagner Form W core and coils that permit a liberal design in small size, lightweight transformers that give excellent electrical performance.



CROUSE-HINDS Type EPC

MOTOR STARTER and CIRCUIT BREAKER

Explosion-Proof CONDULETS* are compact!



Type EPC Combination Line Starter Conduilet with Broken-Away Covers Showing Interior Starter and Circuit Breaker Assembly

Little space required for a big installation

Crouse-Hinds exclusive vertical cylindrical design conserves horizontal space that is always at a premium, speeds up installing and wiring, and saves money on the construction of steel mounting racks.

- **Explosion-proof, dust-tight,** and **weather-resistant** (raintight).
- **Light-weight cast aluminum** — for easy installation and maintenance. No lifting equipment required. Saves time and money.
- **Flame-tight threaded joints** throughout — the type of construction that was pioneered by Crouse-Hinds. Covers are taper-threaded with seven threads for extra safety. Operating shafts and bushings are thread-in-thread construction.
- **Seven conduit entrances** — give you the choice of either vertical or horizontal "through feed", "U" at either top or bottom, "T", or "L" at either side or back. Saves money by simplifying installation. Large central body — for easy wiring.
- **Built-in push button stations** and built-in selector switch are available.
- **Versatile.** Wide selection of well known controls. Starter sizes 0 to 5. Circuit breakers 50 to 600-Amp. frame sizes.
- The Crouse-Hinds Type EPC advantages all add up to **lower installed cost** and **lower maintenance cost.**

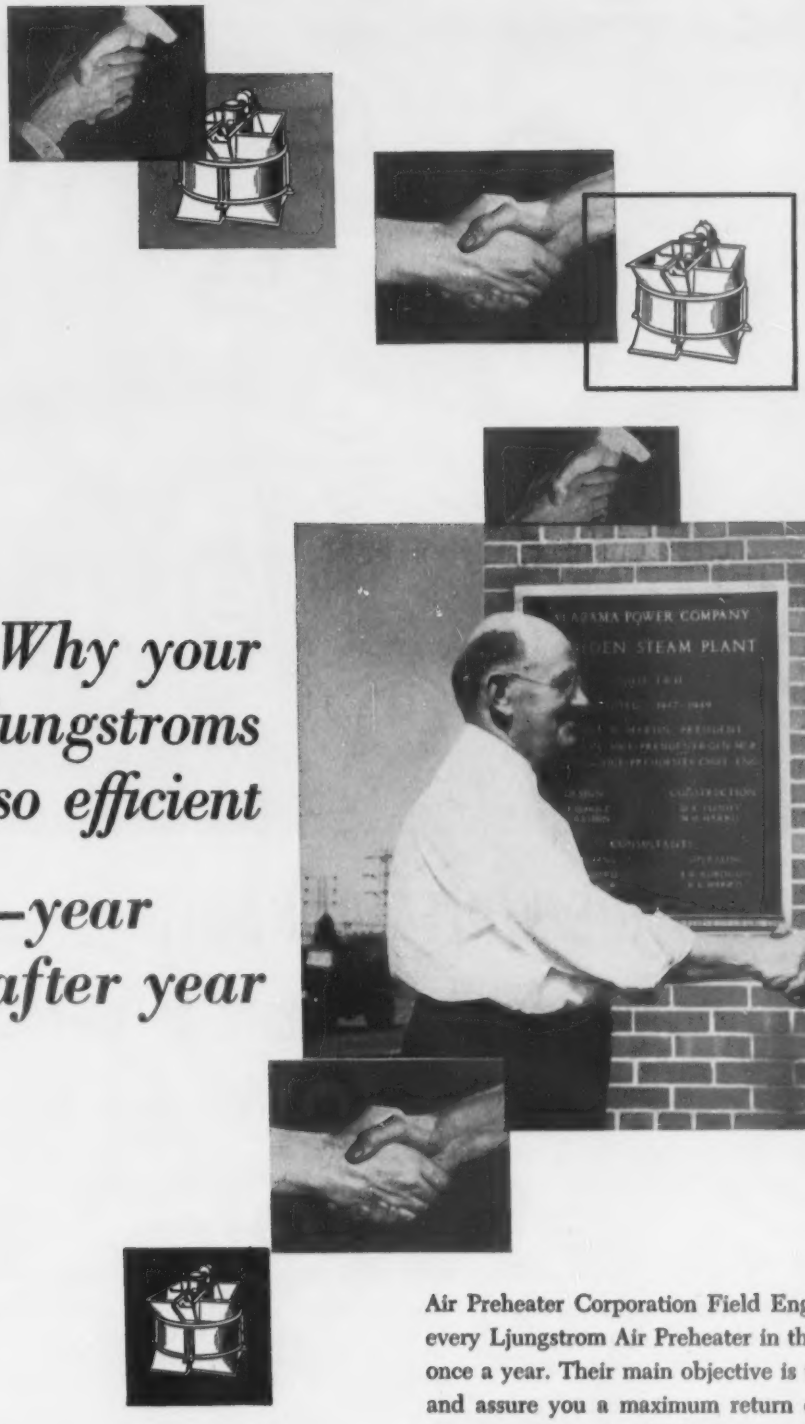
CONDULETS are made only by CROUSE-HINDS

A Nationwide Distribution Through Electrical Distributors

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Amarillo — Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City, Mo. — Los Angeles — Memphis — Milwaukee — New Orleans — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — St. Paul — Tulsa — Washington, D. C.
RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Charlotte — Chattanooga — Corpus Christi — Reading, Pa. — Richmond, Va. — Shreveport
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS



Why your Ljungstroms are so efficient

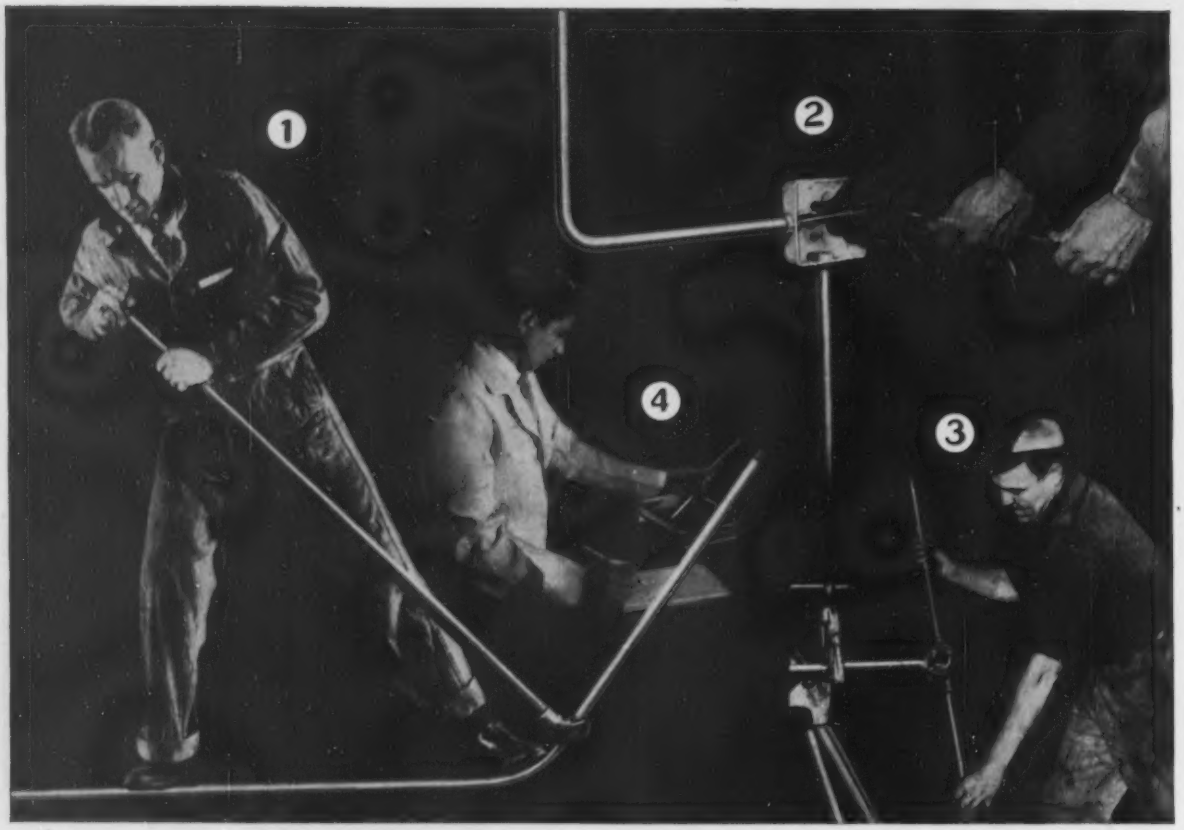
—year after year

Air Preheater Corporation Field Engineers aim to visit every Ljungstrom Air Preheater in this country at least once a year. Their main objective is to increase availability and assure you a maximum return on your investment. They are always available for consultation.

This is just another reason why the Ljungstrom Air Preheater is *the most economical heating surface on the modern boiler.*

THE AIR PREHEATER CORPORATION

60 East 42nd Street
New York 17, N. Y.



NEW G-E WHITE CONDUIT

...easier to install...more resistant to corrosion

1. EASIER BENDING. The new G-E White is galvanized by metallizing, a process which locks a uniform coating of pure zinc to the conduit. Metallizing eliminates the excessive heat and the quenching and straightening used in other processes. The result is a more ductile conduit.

2. EASIER FISHING AND WIRE-PULLING. The tough, tightly-bonded, corrosion-resistant coating used inside the conduit contains a special antifriction agent. This provides a smooth interior surface that lets wires slide easily, and cuts fishing and wire-pulling time.

3. EASIER THREADING. The metallizing process produces a unique zinc structure that acts as an ideal cutting lubricant and makes threading at the installation site easier.

4. BETTER CORROSION PROTECTION. Metallizing bonds a uniform coating of pure zinc to the entire outside surface of the conduit, including threads. Grueling tests prove that new G-E White offers improved resistance to corrosion from smoke, heat, humidity, acid fumes, alkalies, and salt atmospheres. The C-553 organic coating over the zinc retards white rust and gives extra protection against rough handling.

New G-E White rigid steel conduit conforms with the American Standards Association Specifications, is listed by Underwriters' Laboratories, Inc., and meets Federal Specification WW-C-581b, dated May 4, 1951. For more information ask your distributor about new G-E White, or write Section C46-627, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC

Reduced Maintenance
Improved Reliability

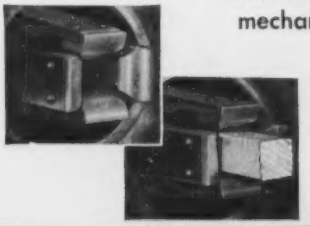
PACIFIC ELECTRIC
Type RHE
CIRCUIT BREAKERS

115, 138, 161 kv — 3 or 5 cycles
196/230 and 230 kv — 3 cycles
to 10,000,000 int. kva (ASA)
at 161 and 230 kv
(Also other types, 7.5 kv and up)

Electrically and Mechanically Trip Free
ASA, AIEE, and NEMA STANDARD

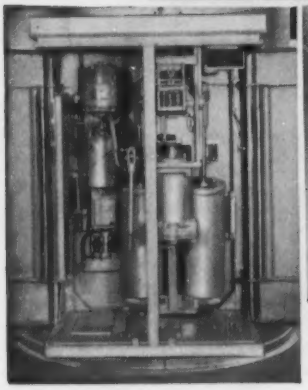
Applicable Standards of ASA, AIEE, and NEMA assure electrical performance of any breaker that meets such requirements . . . but *mechanical* construction, upon which maintenance cost and reliability largely depend, still remains subject to the manufacturer's design approach.

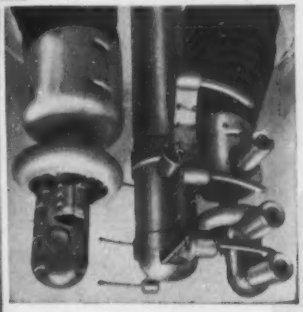
Pacific Electric solicits critical examination of its Type RHE breakers from both the electrical and mechanical standpoints.



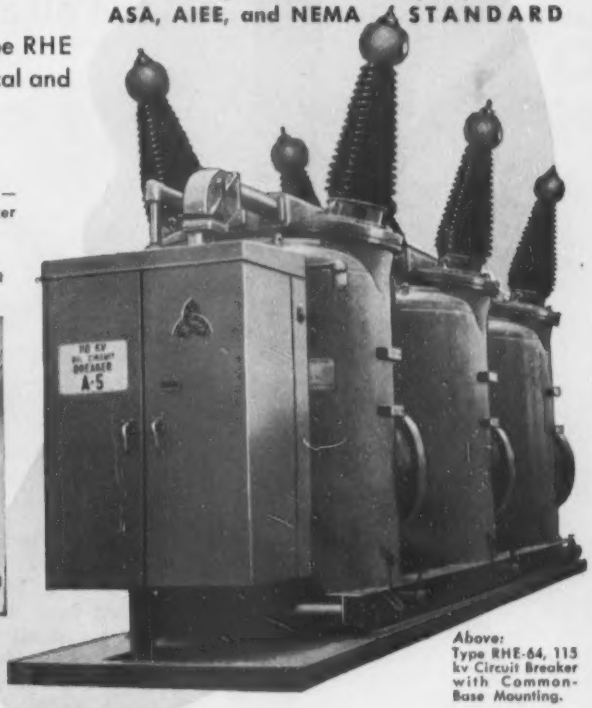
At Left:
Sliding Shoe (finger) Contacts — Six Such Groups in Each Breaker (shown open and closed).

Below:
One-Piece Moving Contact Structure and Interrupters.





At Left:
Operating Mechanism with Oil-Hydraulic System.



Above:
Type RHE-64, 115 kv Circuit Breaker with Common-Base Mounting.

PACIFIC TYPE RHE Breakers embody mechanical features that contribute to low maintenance cost and improved reliability of the breaker and the substation at which it is located. These features assume increasing importance as the upward trend of wages and service salaries continues.

Only One Moving Element in the Tank—Opening accelerating springs and shock absorbers are outside of the tank. As no parts in the tank require service adjustment, maintenance within the tank is largely eliminated. Entrance bushings are under negligible mechanical stress.

Nested Sliding Shoe (finger) Contacts—Self-cleaning; arc foot-points confined to portions of surfaces that do not carry load current; minimizes contact dressing.

Oil-Hydraulic Restoration of Closing Energy—Simple; reliable. Full energy restoration in ten seconds by conventional oil-hydraulic components that also embody provision for decelerating the closing stroke.

Anti-Friction Bearings—Sealed and lubricated at time of assembly, require no further attention. Lubrication points practically eliminated.

Easy Manual Operation for Load Switching—If control power is lost, the breaker may be closed manually. Then two minutes' hand operation of the oil pump prepares the mechanism for O-C-O after fault, or for manual closing after manual opening—all at rated speeds.

These and other advanced features are described in Catalog 585.

Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

PACIFIC ELECTRIC MFG. CORPORATION

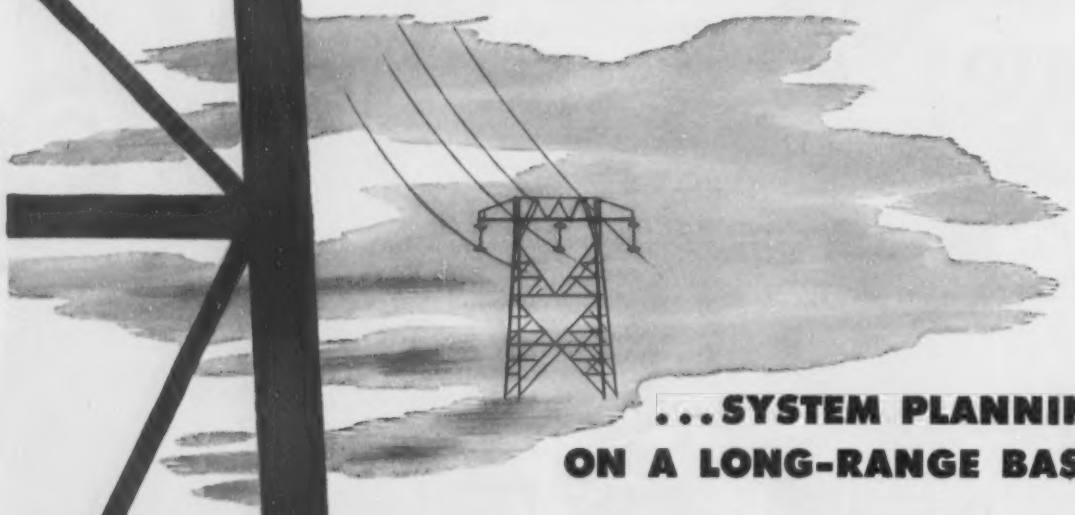
SUBSIDIARY OF FEDERAL ELECTRIC PRODUCTS COMPANY

5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA

OTHER FACTORIES: SANTA CLARA, CALIF.; SCRANTON, PENNA.

How Ebasco helps

the electric power industry



...SYSTEM PLANNING ON A LONG-RANGE BASIS

Through a knowledge of electric utility operations gained from almost 50 years of experience with power systems of all sizes all over the world, Ebasco offers a long-range system planning service designed to meet the specific needs of individual companies or groups of companies anywhere.

Ebasco specialists will help you find economic answers to both the engineering and service problems involved in the planning of utility system additions or improvements. Your present system is analyzed—your markets, load growth, and service requirements evaluated in light of present and future needs. These specialists help determine what new generating, transmission and distribution facilities are required—where and when to build them. All factors are taken into consideration to assure an adequate power supply, good service and optimum, over-all economy.

Our booklet—"The Inside Story of Outside Help"—describes Ebasco services and how they may be of use to you. For a copy, write or phone Ebasco Services, Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

Ebasco Teamwork gets things done anywhere in the world

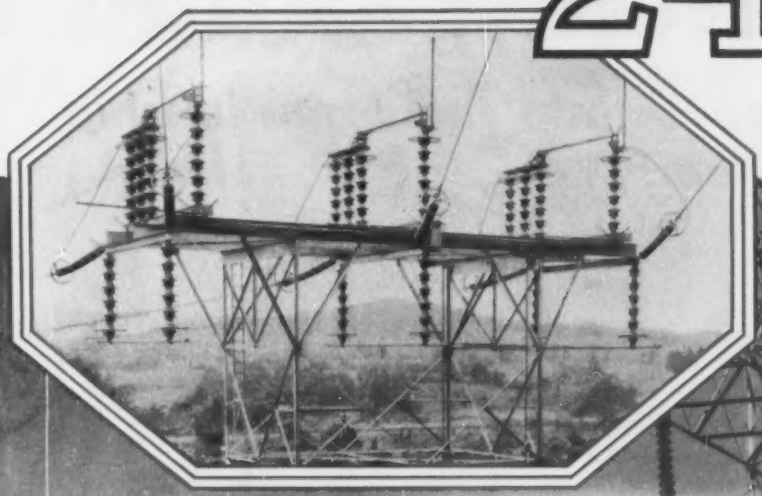
NEW YORK • CHICAGO • WASHINGTON, D. C.

EBASCO

Appraisal • Budget • Business Studies
Consulting Engineering • Design & Construction • Financial • Industrial Relations • Inspection & Expediting • Insurance, Pensions & Safety • Purchasing
Rates & Pricing • Research • Sales & Public Relations • Space Planning
Systems & Methods • Tax • Traffic
Washington Office

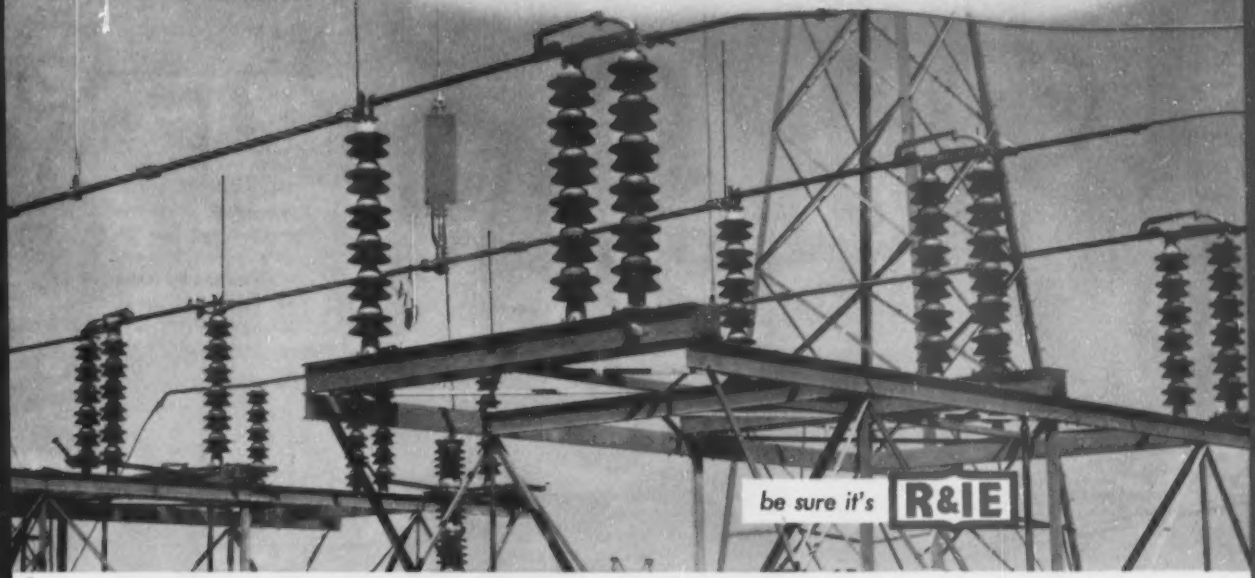
24 *years old..*

the original 220 Kv. switch installed in the East—is still in service.



or Twenty-four weeks new.

The modern 220 Kv. TTR49 switches have been added to the same system.



be sure it's **R&IE**

TWENTY-FOUR YEARS OF PROGRESS and DEVELOPMENT. Here's a typical example — of how R&IE has paced the growing needs of Power Transmission. Over and over again, R&IE switches have been added to power systems because of previous performance of earlier designs.

The recently installed type TTR49 switches shown here feature the new high thermal capacity, Hi-Pressure contacts, on the jaw and hinge. The hinge contacts are sealed in, protected. The switches are designed for today's problems of high short circuit currents, ice loading, low radio influence voltage, high voltage, and line sectionalizing.

R&IE development is already anticipating these same problems for the next 24 years.

R&IE SWITCHING EQUIPMENT

DIVISION OF I-T-E CIRCUIT BREAKER CO.,
GREENSBURG, PA.

STRUCTURES—steel or aluminum ● TESTING DEVICES ● KIRK KEY INTERLOCK SYSTEMS ● ISOLATED PHASE BUS STRUCTURES ● INTERRUPTER SWITCHES

INDOOR BUS SUPPORTS and BUS FABRICATION ● OUTDOOR BUS SUPPORTS and AIR SWITCHES ● SUBSTATION

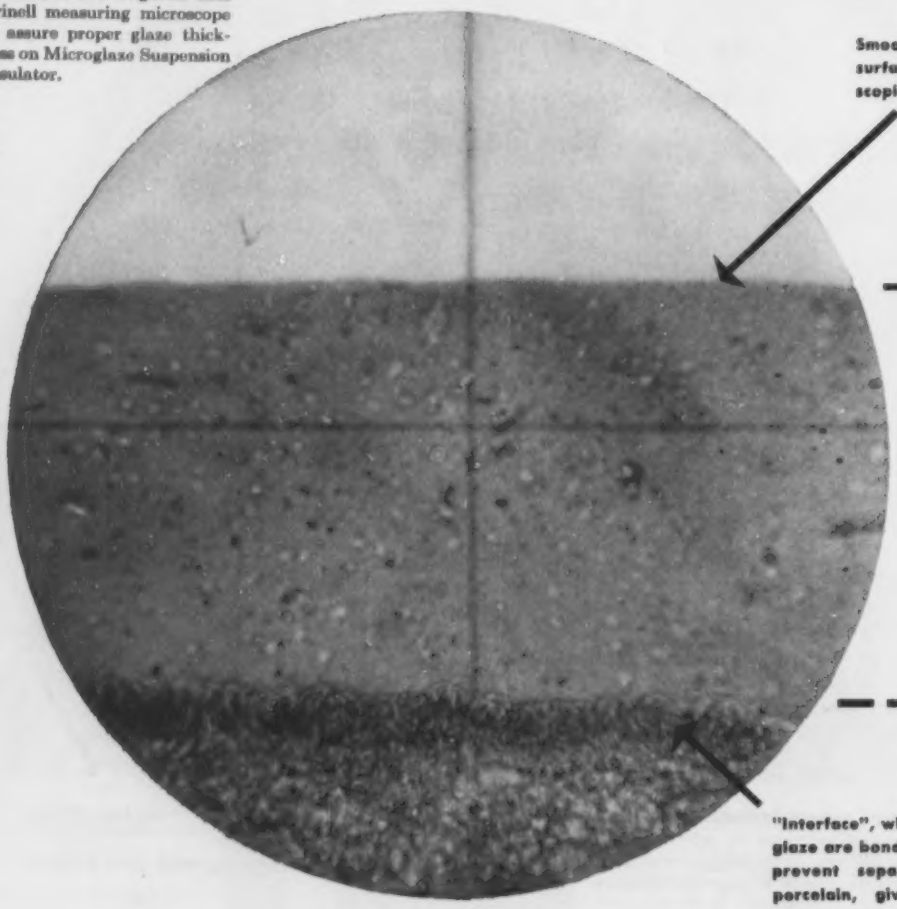
Locke reports new facts about

GLAZE THICKNESS and

Research into their relationship leads Locke to develop . . .

Locke Ceramic Engineer uses Brinell measuring microscope to assure proper glaze thickness on Microglaze Suspension Insulator.

Photomicrograph of cross section near surface of Microglaze Suspension Insulator



Smooth, self-cleaning glaze surface results from microscopic glaze thickness control.

Thickness of glaze, measured between surface and junction with porcelain body is controlled by Locke to achieve peak strength.

"Interface", where porcelain body and glaze are bonded. Interlocking crystals prevent separation of glaze from porcelain, give added strength to Microglaze Insulators.

INSULATOR STRENGTH

NEW MICROGLAZE SUSPENSION INSULATORS

An insulator's ability to withstand mechanical impact varies with thickness of the compression glaze on its surface. Too much glaze . . . or too little . . . will prevent full development of insulator strength.

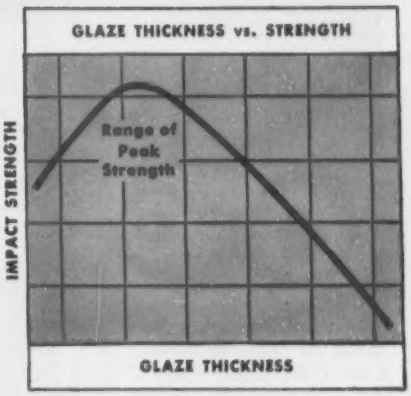
However, laboratory tests show that porcelain with a smooth coat of compression glaze, held within a microscopically narrow range of thickness, will be as much as 40% stronger than improperly glazed porcelain.

Locke has been quick to bring this discovery out of the lab and onto the production line for the benefit of all insulator users.

The result is the new MICROGLAZE Suspension Insulator.

Microscopic control of glaze thickness is now applied to these mass-produced suspension insulators, resulting in uniform peak strength, assuring you a new kind of protection . . . and longer, trouble-free insulator service life.

Next time specify MICROGLAZE Suspension Insulators . . . your best insurance yet against the hazards of mechanical impact.



Research in Locke laboratories proves definite relationship between glaze thickness and both flexural and impact strength of the porcelain. Curve shows how impact strength increases with increasing glaze thickness, reaches peak, then drops sharply. On Microglaze Insulators, glaze thickness is maintained within the narrow range which gives *peak* strength.

Accurate glaze thickness control is accomplished by use of this precision glazing machine. As each insulator spins its way around the wheel, it is cleaned, moistened, glazed, exactly the same way as every other. This, combined with special control of many other factors assures uniform appearance, uniform top strength, uniform reliability.

Send today for new 8-page folder titled "The Story of Microglaze Insulators"

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

*Trademark of General Electric Company

For 14.4-Kv Service ... Tank-

ROOMY OPERATOR CABINET. Access to operator is unrestricted. Relays when specified are in separate cabinet which can be secured against unauthorized personnel. Operator is high speed solenoid type—mechanically and electrically trip-free. Side hinging of L-shaped doors allows access to operator cabinet from three sides. Only 7 inches of clearance in front of cabinet needed to open doors.

BREAKER RATINGS (8-Cycle Standard Interrupting Time)

Type	Rated Kv	Rated Amps	INTERRUPTING RATING			Weight of Breaker With Oil (lbs)
			RMS TOTAL AMPERES		Kva	
			At Rated Volts	Maximum Rating		
OZ-15-100	14.4	600	4,000	15,000	100,000	2,350
OZ-15-250	14.4	600	10,000	25,000	250,000	2,370
OZ-15-250	14.4	1200	10,000	25,000	250,000	2,470
OZ-23-250	23	600	6,300	12,000	250,000	2,370

A-C ALLIS-CHALMERS

ALLIS-

Per-Phase Design

in addition, breaker sets high standards of operating convenience

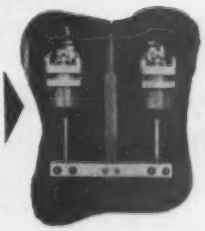
Compare this breaker with any other in its class. Note the clean design; the uncluttered operator cabinet; the accessibility to all component parts. Check the features shown below. Then, GET COMPLETE INFORMATION! Call your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4254

VISIBILITY PLUS — external position indicator easily visible at a distance from front or side. Contact position indicator also provided inside cabinet. In addition, maintenance closing device is side operated. Man closing breaker can observe contacts and man working on them.

RELAYS — when specified, are in separate cabinet from operator. Whether you operate the breaker — slam the door — or let the wind slam it, relay contacts will not operate accidentally. Relay panel is fixed and shock-mounted at four points. Troublesome hinge wiring eliminated. Separate door in rear of cabinet provides access to back of relays.

NO BURIED LEADS. No more conduits, pipes and fittings! To get at bushing current transformer leads, simply remove 3 pins at bottom of fabricated wiring duct and remove bottom plate. This is typical of the well-engineered features that make this breaker outstanding in its field.

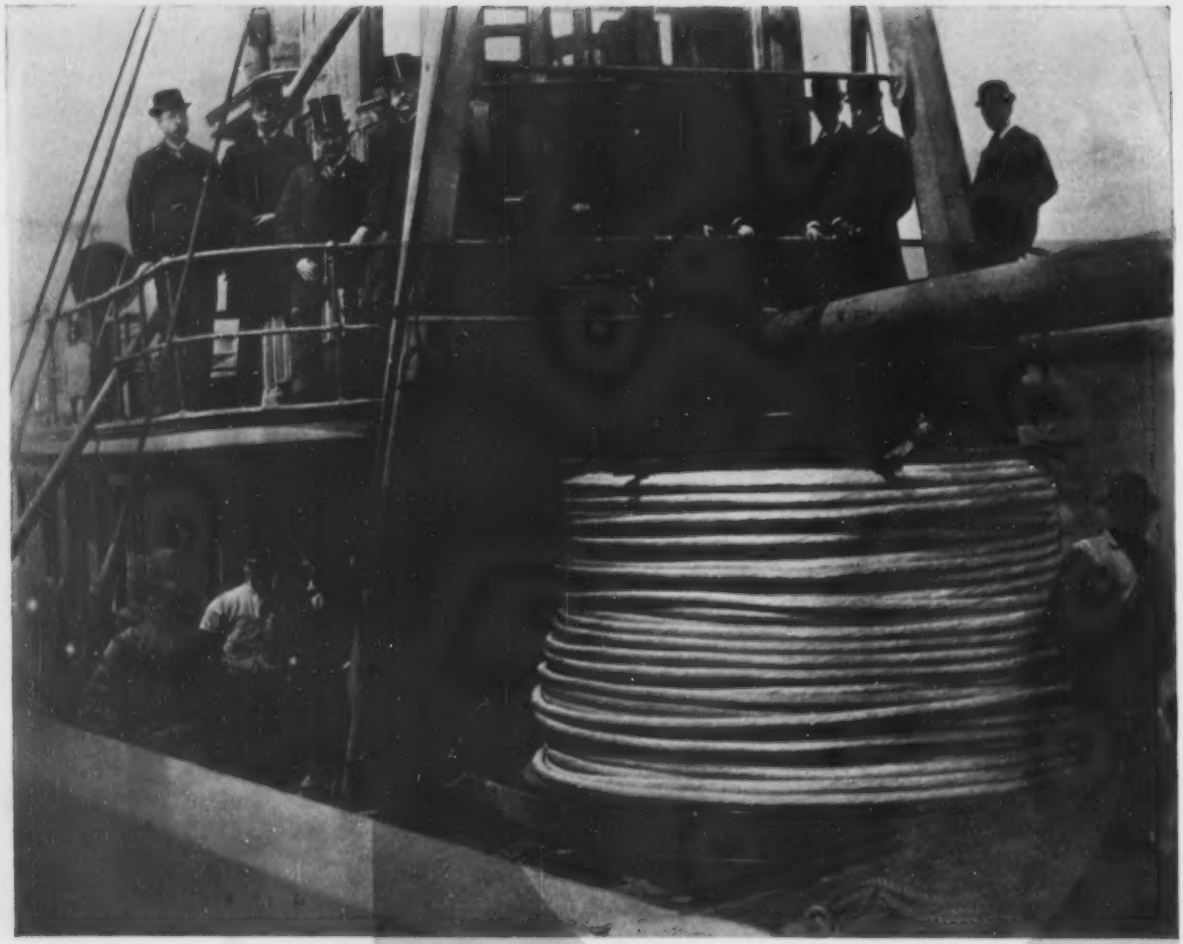
TANK-PER-PHASE construction — as used in large breakers—has high safety factor. It completely isolates phases and eliminates internal phase-to-phase flashover. A maximum of 12 gallons of oil in each tank makes it a simple matter to raise and lower tanks.



DOUBLE BREAK per phase principle is used with time-proved *Ruptor* interrupting devices. Self-wiping, self-aligning tulip and bayonet contacts are used. Here again, Allis-Chalmers provides the same quality construction as is used on large A-C breakers.

Ruptor is an Allis-Chalmers trademark.

CHALMERS



1880 *preferred then . . . and now*

THIS reproduction was made from an old photograph dated 1880, found in the Kerite archives at Seymour, Conn. It was taken as the steam tug "Western Union" completed the laying of an 18-conductor Kerite insulated submarine telegraph cable from New York, under the Hudson River, to Jersey City. It indicated that Kerite insulated cable was contributing to the furtherance of submarine telegraph circuits long before the turn of a century.

The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

100 DAYS KERITE 100th Anniversary 1854 1954

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Ave., Boston

Harold Quinton—His EEI Program

On June 3 Harold Quinton became president of Edison Electric Institute. Following a practice of many years, Electrical World takes this opportunity to present the background and program of the new industry leader.

Quinton entered the industry in 1942 as vice president in charge of finance for Southern California Edison Co. The previous 16 years he had been a partner in Arthur Andersen & Co, certified public accountants. While in this position he was in charge of the audit work and tax problems of the utility. Prior to that he had been in the Treasury Department at Washington. In 1948 he became executive vice president of Southern California Edison, a position he held until he became president in April of this year.

To the presidency of EEI he brings not only his vast experience in the nation's sixth largest electric company but also the thinking of that rapidly expanding, optimistic section of the country. He will be no stranger in the EEI offices. Twice he has served as a director. During the past year he was vice president. For years he has worked with institute financial groups, such as the Special Tax Policy Committee.

His firm grasp of industry problems was evident in his acceptance speech at Atlantic City. He proposed this three-part program for the coming year:

1. That the institute continue to point out and cooperate in the elimination of the cost of unnecessary duplication in regulatory processes. He includes in this the repetitive filing of securities issues.

2. That the companies continue to cooperate with the federal government in developing water resources in connection with projects for navigation, flood control, and reclamation of public lands but that private enterprise should undertake the generation, transmission, and distribution of any related electric power development.

3. That the institute and member companies continue to inform the American people on costs, return on investment, rates, capacity, expansion plans, advances in equipment and methods, and new uses for electricity.

"At the same time we will continue to unmask and urge removal of the supports of government power—tax exemptions, selling power from federal dams far below true cost, and the un-American preference clause to the favored few."

Reflecting his background as president of one of the fastest growing power companies in the nation, Quinton advocates aggressive "selective" selling by utilities. But he believes each must do its own selecting after taking into consideration all the factors affecting its operations and its load shape.

He favors improved adequate wiring programs without which the industry cannot progress to the fullest extent. And he believes EEI should give these programs every support possible.

In the field of research he sees great opportunity for member companies to increase their investigations of the application of power equipment. He suggests that they should work more closely with manufacturers on equipment design and application problems.

It will be hard for any member company to find fault with any of these proposals. Undoubtedly the new president could have made many others. But a year is not very long. If the industry will get behind these proposals and further them to the best of its ability, there can be no doubt that Mr Quinton's term of office will be marked by great industry progress.

War on Discarded Refrigerators

"To extinguish or destroy by deprivation of air" is a definition of "suffocate" given by Webster. That's what happens when a child who has not read the definition, who could not understand it anyway, crawls into a discarded refrigerator and the door latch clicks. It happens unless the door is opened soon. And too often the door stays closed.

Who is to blame? The person or persons, of course, whose carelessness set the deadly trap. But there would be no traps for carelessness to set if there were no refrigerators, no freezers, no air-tight boxes with strong latches on the doors. Although no blame extends to them in the matter, the makers of such products do feel a responsibility.

This is why the Refrigerator and the Farm and Home Freezer Sections of Nema are actively promoting a continuing program to combat the menace, in cooperation with the National Safety Council. Just as the manufacturers feel a responsibility, so also should every other segment of the electrical industry. They too—utilities, contractors, distributors, retailers—all helped to set the stage where carelessness plays its tragic role. On them lies an obligation to join in with the Safety Council and the Nema sections to assure that the flame of life in a child is not extinguished "by the deprivation of air."

Another Diamond Anniversary

On March 26 the Cleveland Electric Illuminating Co unveiled a plaque commemorating the achievements of Charles Francis Brush who, said Elmer Lindseth, CEI president, gave Cleveland "the first public electric street lighting installation in America." Brush was a giant among the pioneers of the electrical industry. His works live after him. But the name of Brush sticks in the mind of the writer of this piece for another reason. Full of youth and ignorance, your scribe was knocked galleywest when he tried to tighten a slipping brush on a Brush arc dynamo while the machine was running. Slipping brushes were frequent, and it was usual practice to tighten them while hot. It had to be done with one hand, the other deep in the pants pocket. This time the left hand got loose and touched the frame of the machine. Thus did the name of Brush engrave itself on one mind.

Warming Up the Customers

If infrared can keep chicks, piglets, lambkins, and other infant domestic fauna warm in chilly weather and can comfort the chapped knuckles and cold nose of the farmer as he works in the frigid milk house, then why can't it make people on the street loiter and look at merchandise instead of hurrying along in the sub-freezing winter air?

No reason why it can't. As a matter of fact, it can.

Testimony to this effect is contained in a story in the Wall Street Journal, which was headed, "Heat Lamps Keep Winter Shoppers Comfortable in Paris." To quote:

"Au Printemps, Paris' biggest department store, has upped its business by the equivalent of $6,000 a day by stringing 80 powerful infrared heat radiating tubes over the block-long series of outdoor sales stalls normally used only in warm weather."

The story continues, telling of several blocks along the main street of Lille, France, completely "summerized" by infrared radiation. Store owners find people spend more time window shopping along the warmed-up sidewalk than across the street where it is freezing cold. The sidewalk cafes continue their open-front operation the same as in warm weather. And in several French villages clusters of infrared lamps are used in outdoor produce markets.

Possibly there is an idea here for enterprising merchants and utilities—actually as well as figuratively "warming up" the customer to buy.

Kerite Co Reaches the Century Mark

The Kerite Co celebrated its 100th anniversary, June 10, at its Seymour, Conn., plant. One hundred years is a long time in an industry only 75 years old. Obviously Kerite was on the scene 25 years before Edison invented the incandescent lamp. In that earlier period Kerite was known as "artificial India rubber" and was hailed as the best insulation for telegraph cables. From that beginning the company grew and readily adapted itself and its products to serve the telephone, electric power, and electric railway industries.

The company still reflects that progressive spirit. At age 100 it is not old but only better experienced to serve the industry. Such a company need not wait for its friends to wish it "many happy returns." It earns them by the service and products it provides.

Multiple TV—Inadequate Wiring

Here's another thing coming to aggravate the problem of inadequate wiring. And it should be given a rousing welcome because the faster the problem worsens the quicker will come its solution.

Nudged out of the living room by TV, radio found multiple refuge in other rooms in the house. In defiance of the croakers radio refused to be killed off by TV. Instead, annual receiver sales continued by the millions. Now appears color TV with, according to some prophets, its threat to black and white. But there are others who believe that black and white will repeat the performance of radio, that the day of two or more TV sets per home is not far off.

One manufacturer—Crosley, it is—recently announced faith in this idea by bringing out the nearest yet to a portable TV set, one that can be picked up and carried about the house. Moreover, Crosley has discontinued manufacture of all other sizes, shapes and models and is devoting all its TV production to the new smaller and lighter receiver.

It does not take a wildly excited imagination to foresee the time when mama will want to watch her favorite soap opera while she does the family ironing. And she will be considerably peeved when the TV picture shrinks and expands or maybe goes and comes as the thermostat in the automatic iron turns the heat on and off. And in many other places about the house the peripatetic TV set will indicate in its characteristic way that it is being starved of voltage. Thus will develop another push towards adequate wiring.

THE ELECTRICAL WEEK

The Issue's News Highlights . . . Senate Public Works Committee votes out Case bill which would let FPC decide who should develop more power at Niagara . . . Supreme Court clears way for construction of St. Lawrence power project.

Senate raises funds for power agencies and projects above amounts voted by House . . . AEC endorses legislation to permit industrial development of atomic power . . . Hells Canyon hearings end with FPC staff recommendations due in a month or so.

Britain's first atomic power plant is rising at Calder Hall, Northumberland.

The year 1954 will find a greater realization of interdependence within the electric industry than perhaps has been felt since before World War II, Bayard L. England, president of Atlantic City Electric Co, told delegates to the 46th Annual Convention of National Association of Electrical Distributors in Atlantic City. "One field in which all segments of our industry must cooperate if we are to continue our growth in the residential category is the promotion of adequate wiring," he said.

Appliance sales are up sharply over 1953 in Florida Power & Light's service area. Some examples reported by the company: garbage disposers, up 76%; vacuum cleaners, up 63%; water pumps, up 66%; television sets, up 32% . . . Carolina P&L reports it now has 22 commercial installations of the heat pump in its service area.

The atom, as represented by U. S. efforts to develop nuclear energy for peace, is going on the road. U. S. Information Service has prepared traveling road shows, first of which will open tomorrow in Rome, displaying models of atomic power plants developed by private industry and the AEC. In addition, two permanent "atoms for peace" shows are scheduled to open in Sao Paulo (Brazil) and Berlin in September.

Cost of building 115 kv H-frame lines in Nebraska is down $2,000 to $3,000 a mile over three years ago, according to Nebraska Public Power District. The district's most recent bid was for $7,000 a mile.

IBEW-AFL and Public Service E&G, Newark, N. J., accepted a proposal by Democratic Gov Robert Meyner to submit their contract dispute to a fact-finding board.

South Korean government has signed a contract totalling $30 million with Bechtel Corp to build three steam stations there within 30 months. Two plants with capacity of 25,000 kw each will be built near Seoul, a third, of 50,000 kw, near Pusan. International Engineering Co of San Francisco won a contract to repair Hwachon Dam, just south of the buffer zone.

Off the Washington Wire . . . Candidates are being lined up to replace Truman-appointee Dale Doty on FPC when his term expires June 22. Among those mentioned are Harry C. Begley, a member of the Illinois Commerce Commission; Elmer Bennett, Interior Department liaison official with Congress and Nyle M. Jackson, administrative assistant to Sen William Jenner, (R-Ind.). The President may appoint either a Democrat or a Republican, and there is an off-hand chance that Doty could be reappointed.

With no hearings and little fuss, the Senate Public Works Committee cleared the bill which would permit Alabama Power Co to build a $100 million, 360,000-kw hydro development on the Coosa River in Alabama. Bill sailed through the House and may be before the Senate within a few weeks. (See page 98).

Congress has passed and sent to the President the bill which directs the Reclamation Bureau to market power from Falcon Dam on the Rio Grande. It contains the same sales preference clause as does the 1939 Reclamation Projects Act and the 1944 Flood Control Act.

I-T-E Circuit Breaker Co acquired BullDog Electric Products Co, Detroit, Mich., by an exchange of stock for an estimated $6 million.

Kansas City P&L asked Missouri and Kansas public service commissions for approval to raise rates about $4,138,000 a year . . . Consolidated Gas, Electric Light & Power Co of Baltimore received PSC approval to raise rates $3.3 million a year.

Waterville, Ohio, is planning to sell its municipal system to Toledo Edison. Company has offered to buy it on sealed bid of not less than $150,000.

Middle South Utilities' earnings per share in '54 will be about the same as in '53, when $1.98 was earned on 7,125,000 common shares outstanding, Pres Edgar H. Dixon said at the utility's annual meeting.

For the first time in the industry's history, U. S. utilities cut monthly coal rate to one pound per kwhr produced in April, FPC reported.

Pennsylvania W&P may include costs of a new 75,000-kw steam plant and a new coal dredging and processing plant in the rate base for computing charges to Consolidated of Baltimore, an FPC examiner ruled.

Executive Changes . . . Dunlap D. Smalley, retired vice president and assistant general manager of Pacific G&E, was named vice president and operating manager of Southern Nevada Power Co . . . Green Mountain Power appointed G. M. McKibben vice president and G. W. Clewley chief engineer.

Two Decisions on New York Projects:

1. Niagara—Case Bill Voted Out

Niagara power development headed for more legislative confusion last week as the Senate Public Works Committee voted out a bill favoring state development of the 1.1 million-kw project at the falls.

This was a setback for the five leading New York electric companies which had sought Congressional approval for private enterprise development of additional Niagara power. The House voted 262 to 120 last July to permit the five companies to carry out the development.

Should the Senate follow the lead of its Public Works Committee, Congress would be faced with trying to reconcile a Senate bill favoring public development and a House bill directing electric company development.

Action on Niagara power legislation has been stymied for nearly a year while the Senate Committee considered various bills. Final committee action came June 8 when the group voted 8 to 5 to report out the bill introduced by Sen Francis Case (R-S.D.) and favored by Chairman Robert Moses of the New York Power Authority.

The bill would direct the Federal Power Commission to issue a license for the Niagara development under its regular procedures. Since the Federal Power Act gives priority to states and municipalities in the issuance of such licenses, the New York Power Authority would have a distinct advantage over electric companies in gaining the coveted license.

Final vote came after nearly three hours of good-natured wrangling among committee members. At one point during the closed-door session no bill on Niagara development was able to muster a majority.

The Votes . . . No official votes on the various measures were announced. However, Electrical World learned that the committee action took this course:

- By a 9-4 vote the committee rejected House-approved Miller-Dondero bill which would have directed FPC to license the private companies to develop Niagara.
- By unanimous vote—13 to 0—the committee turned down the Ives bill which would have directed FPC to license New York Power Authority to develop Niagara.
- By a 9-4 vote the committee turned down the Lehman-Roosevelt bill which would have permitted New York State to develop the power but would have directed the state to give preference to public bodies and cooperatives in the sale of power produced.
- By an 8-4 vote the committee voted down a preference clause amendment to the Case bill. This would have directed the licensee—presumably the state authority—to give preference in sale of power to public bodies and cooperatives.
- Finally by an 8-5 vote, the committee voted to approve the Case bill without amendment.

Motion to attach the preference clause to the Case bill was made by Sen Albert Gore (D-Tenn.) and vigorously supported by Sen Wayne Morse (Ind-Ore.).

Next step was to write a report to accompany the committee recommendation and report it to the full Senate where it would be placed on the calendar of pending legislation. It will be up to the Senate Republican Policy Committee to decide whether to attempt to bring it to a vote in the Senate during the current session.

Once the bill is brought up for Senate debate it may either be amended or passed as is. Amendments may be so comprehensive as to, in effect, substitute the electric company bill or some other bill for the Case bill.

Should the Senate approve the Case bill as recommended by the Public Works Committee, there might be an attempt to send it to a House-Senate conference committee to try to resolve the diametrically opposed bills. House-appointed conferees would have a difficult time backing away from the private development bill in view of the overwhelming 262-to-120 vote for it last year.

Should the Senate fail to debate and vote on a Niagara bill, or should a stalemate develop between the House and Senate actions, the measures would die at the end of this Congress. Since a new Congress—the 84th—would take over next year, any legislation on Niagara development would have to start from scratch.

2. St. Lawrence—A Green Light

Supreme Court has cleared the way for construction of the St. Lawrence power project by the New York State Power Authority, in cooperation with the Hydro-Electric Power Commission of Ontario. The action also knocks down the last legal roadblock standing in the way of the St. Lawrence seaway.

On its last "decision Monday" of the current term, the Supreme Court turned down a plea by the Lake Ontario Land Development and Beach Protection Association, designed to upset a license granted by the Federal Power Commission to the State Power Authority to go ahead on the power project. The Protective Association, one of three groups who fought the license in court to appeal to the Supreme Court, argued water levels raised on Lake Ontario by the project would cause millions of dollars of property damage to its member landowners.

Last January, the U. S. Court of Appeals for the District of Columbia threw out this appeal, along with others by the Central Pennsylvania Coal Producers' Association and the Public Power & Water Corp of Trenton, N. J. In affirming the court of appeals ruling, the Supreme Court gave no reasons for its decision.

The government's brief stressed the importance of the power project to successful building and construction of the seaway, and pointed out that while no actual damage to property owners was expected to develop, adequate money remedies were available if any did.

Now that the way is clear, officials for the New York State Power Authority expect to complete financing arrangements and begin construction by July 1. Estimated cost of the power project is $600 million. U. S. half of the project will have a capacity of 1.1 million hp. The project will be located in the International Rapids section of the St. Lawrence River.

Senate Hikes Power Funds

Table I—Fiscal '55 Appropriations Recommended for Interior

Agency	Budget Request	House Action	Senate Action
BPA	$36,800,000	$23,915,000	$32,900,000
SPA	1,030,000	625,000	2,337,000
Sepa	1,450,000	1,228,000	1,228,000
Reclamation	155,292,000	140,179,700	164,190,127

Table II—New REA Loan Authority

Budget Request	$ 55,000,000
House Action	100,000,000
Senate Action	135,000,000

Table III—Funds Approved for Corps Projects

Project	Budget Request	House Action	Senate Action
	(In Millions of Dollars)		
Blakely Mountain Reservoir (Ark.)	1.6	1.6	1.6
Folsom Dam (Calif.)	15.0	14.0	15.0
Jim Woodruff Lock and Dam (Fla.-Ala.)	6.0	5.0	5.0
Buford Dam (Ga.-S.C.)	5.8	5.8	9.5
Hartwell Dam (Ga.-S.C.)	—	—	.5
Clark Hill Reservoir	2.2	2.2	2.2
Albeni Falls Reservoir (Idaho)	4.3	4.0	3.8
Gavins Point Reservoir (Neb.)	11.0	11.0	11.0
Garrison Reservoir (N.D.)	27.5	24.0	26.5
Table Rock Reservoir (Mo.-Ark.)	—	—	3.0
McNary Lock and Dam (Wash.-Ore.)	24.0	24.0	24.0
Lookout Point Reservoir (Ore.)	4.0	3.0	3.0
The Dalles Lock and Dam (Ore.-Wash.)	34.1	29.0	38.0
Fort Randall Reservoir (N.D.)	17.0	17.0	17.0
Oahe Reservoir (S.D.)	9.0	9.0	11.0
Cheatham Lock and Dam (Tenn.)	4.2	4.0	4.0
Old Hickory Lock and Dam (Tenn.)	14.3	12.0	14.0
Chief Joseph Dam (Wash.)	27.0	27.0	30.0
Totals	207.0	192.6	219.1

The Senate voted last week to permit Southwestern Power Administration to continue its present interim power contracts with rural electric generating and transmission cooperatives into the next fiscal year.

Vote came on the Interior Department appropriations bill for fiscal 1955. The bill now goes to conference to iron out differences between the House and Senate versions. The Senate bill would provide $1.7 million for SPA to continue the interim power contracts, which replaced the controversial SPA-co-op lease purchase contracts previously rendered inoperative.

Funds for the contracts were carried in the same bill with a number of other increases for Interior Department power agencies (Table I).

REA Loan Funds Raised . . . The Senate voted earlier to increase new Rural Electrification Administration loan authority from the House-approved $100 million to $135 million. This was a whopping $80 million above the $55 million in new REA loan authority requested by the Administration (Table II). It was a vigorous Congressional endorsement of the REA electrification loan program.

In all, REA will have nearly $228 million in electrification loan authority if the Senate figures are sustained by a House-Senate conference committee.

The Senate committee also urged REA to give "appropriate attention to the possibility of utilization of atomic energy for electric power generation in rural areas."

More Money for Corps Projects . . . Earlier the Senate had also voted to increase funds for Army Corps of Engineers multipurpose water projects from the House-approved figure of $192.6 million to $219.1 million (Table III). In this funds bill, the Senate voted to add $3 million to the $5.1 million voted in previous year for the controversial Table Rock reservoir in Missouri and Arkansas. Total cost of the project is put at $78.6 million.

The Senate also approved $500,000 to begin construction of the $90.6 million Hartwell Reservoir on the Savannah River in Georgia and Florida. Neither the Administration nor the House had approved funds for this project. Also voted was a sizable increase for The Dalles Dam in Washington and Oregon. The Senate approved $38 million for construction on this huge power project during the fiscal year beginning July 1. The Administration had requested $34 million and the House $29 million.

Boost for USBR . . . For Interior power agencies, the Senate voted the largest increase for Bureau of Reclamation construction projects. The Senate urged a program of $137 million which would include some $5 million in carryover funds from previous appropriations. This was some $18 million above the House-approved figures for Reclamation construction.

Among the projects which would benefit if the Senate figure is adopted are the Missouri River Basin transmission division for which $13.4 million was voted by the Senate as compared with $11 million voted by the House; the Weber Basin project in Utah for which the Senate approved $7.9 million as compared with $6.0 million voted by the House; and the Central Valley Project in California for which the Senate voted $23.4 million against $21.0 million by the House.

BPA Funds . . . The Senate also voted to increase Bonneville Power Administration construction funds $7 million above the House figure of $18.9 million. Most of this increase would be used in making additions and extensions of BPA's major grid system. The Senate recommended that $1.4 million be provided for BPA transmission facilities to serve the Coos Bay area, although the House had provided no funds for this purpose.

The Senate okayed $1.6 million for transmission facilities for The Dalles area service and $5.1 million to permit construction of transmission facilities between Chief Joseph Dam and Snohomish County PUD's.

No changes were made in House-approved funds for Southeastern Power Administration.

AEC Backs Industrial Bill

Commissioners tell Joint Committee they favor licensing private, public groups to build nuclear power plants

The five-man Atomic Energy Commission strongly endorsed legislation to foster industrial development of atomic power as the first round of hearings on the measure drew to a close last week.

While calling for a number of modifications in the redrafted measure (EW, June 1, p 7), they presented a united front on all but one provision —that of making the AEC chairman the principal officer of the commission. In that clause, the commission split 3-2 against the language.

The three Truman appointees on the commission urged that all commissioners be given equal status under the law. In the course of their argument they charged they had not been given access to important information in the atomic field which was available to Chairman Lewis L. Strauss.

Chairman's Role Argued . . . This issue of superior status for the AEC chairman threatened further to delay Congressional action on the bill as members of the Joint Congressional Committee chose sides in the controversy. With the present deadline for adjournment now set between July 15 and July 31, there was room for doubt that the legislation could be brought to a vote during the current session.

The bill as now written would permit industrial or public groups to secure AEC licenses for the development, construction and operation of electric generating plants fueled by nuclear sources. It provides that title to all nuclear fuel remain with the federal government. Patents arising from such development would be subject to normal patenting procedures.

The AEC commissioners in a joint statement read to the Congressional committee made these points:

- They endorsed the procedures which would permit downgrading the classification of reactor (firebox) information. This is the data of chief interest to power plant development, and the bill would make it easier to distribute such information among industrial and public power technicians and engineers.
- They endorsed a two-step licensing process which would let the commission issue one license for development of a plant and a second for actually operating a plant.
- They supported the pricing features of the bill which would permit AEC to determine the prices of fuel to be furnished for power operations and the prices at which fissionable material produced in the plan would be reclaimed by the government.
- On the patenting features of the bill, the commissioners urged that some sort of compulsory licensing arrangements be worked out to prevent monopoly over basic inventions. Such arrangements would be required for a five to ten-year period, they argued.
- They made it clear they have no intention of going in the power business themselves with the declaration that only such power produced as a by-product of production activities will be disposed of by the commission.
- The commissioners agreed that "the bill makes no distinction between the rights of private groups and the rights of public groups to participate in the development of peacetime industrial applications of atomic energy and to own and operate atomic energy facilities."
- For the first time the commission made it known that it had contemplated the possibility of private ownership of nuclear material used or produced in privately owned reactors. However, it said it had no objection to continued federal ownership of such material as provided in the bill.
- The commission strongly opposed a clause which would limit its control over information to that classified as restricted. It wanted broader power over non-classified data.
- The commission also took issue with a provision which would levy fines against any person who might disclose restricted information, urging that such penalties be applied only to persons who "knowingly" disclose such information.

FPC Hearings on Hells Canyon End

The Hells Canyon hearings before the Federal Power Commission came to a close last week. The final witnesses were the engineers from the FPC's San Francisco Office. John C. Mason, attorney for FPC, said that the commission staff position for or against granting to the Idaho Power Co of a license to develop three dams on the Middle Snake River would not be known unitl its first brief is filed. This might be a month to three months away. However, the staff did give its position on two factors: safety and economic feasibility.

Wilfrid A. Froggatt, civil engineer in charge of licensed projects, summed up the position of the other two staff engineers when he said that "safe and adequate structures comprising rock-filled dams with concrete membranes can be constructed to the heights proposed at Brownlee, Oxbow and Hells Canyon by Idaho Power's plan."

He differed, however, on estimate of the cost as Idaho Power had presented it. Froggatt said that his estimates, assuming construction and financing by Idaho Power of a three-dam project having rock-filled dams with clay cores, is $184,192,000. Idaho Power had presented the figure $133 million.

Earlier in the week FPC's hearing examiner William J. Costello struck all the testimony of Leland Olds, former FPC chairman, on the grounds that "his testimony was not proper subject matter for an expert witness."

In effect, Costello ruled that Olds' opinions and theories about public policy on power as related to the Hells Canyon controversy were not "expert" testimony of the kind being taken by the hearing examiner at this time.

Idaho Power's case is: (1) It can fully develop the Hells Canyon stretch of the Snake River at a far lower cost of producing power than any other plan, and (2) make possible the production of over 40 billion kwhr before high dam project could be built.

National Hells Canyon Association says: (1) Federal development of Hells Canyon is necessary to achieve multipurpose objectives and (2) Idaho Power has failed to meet the test of comprehensive development of Middle Snake River and Hells Canyon.

Detroit Gets Bids . . .

. . . for 50,000-kw unit in Mistersky Station. Brown Boveri fails to offer tender

The Detroit Public Lighting Commission last week opened bids for the second time within a year for installation of a 50,000-kw steam turbogenerator in the Mistersky station.

Bidders were: General Electric Co, $1,920,000; Westinghouse Electric Corp, $1,895,700; and Allis-Chalmers Manufacturing Co, $1,950,667.

All bids have been referred to Burns & Roe, Inc, consulting engineers, to determine if they meet specifications.

Original bids were thrown out last fall. Low bid of Brown Boveri Corp of New York was not accepted because firm had no previous experience in building the type of unit needed (EW, Oct. 12, p 44). Its original bid of $1,296,000 was $650,000 under Westinghouse's next lowest bid.

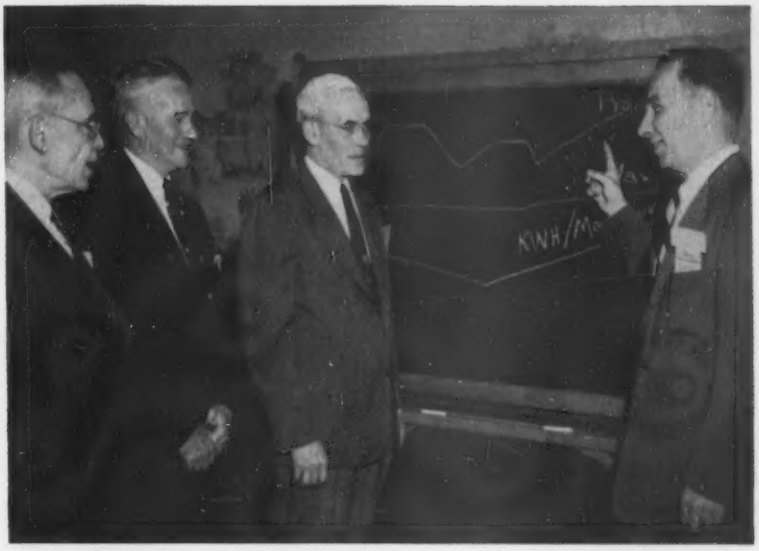
Charges Discrimination . . . Missing among this year's bidders was Brown Boveri which said it would not make an offer, contending discriminatory clauses in the specifications apply solely to it.

Clauses cited by Brown Boveri evolve from two requirements: (1) Any bidder must be licensed to do business in the State of Michigan; and (2) any bidder must be the manufacturer.

Bond Controversy . . . Both stipulations would exclude most foreign bidders. However, according to Arthur Lorenz, superintendent of public lighting, the city also furnished a loophole which permits an agent to bid if a five-year $500,000 surety bond is posted.

Lorenz said this clause was included at the suggestion of Brown Boveri representatives whom he declined to name. A check with Brown Boveri revealed the firm did not want a five-year surety bond, but favored a two-year bond.

Brown Boveri presumably could qualify under the first stipulation, Lorenz said. But President Sidler said Brown Boveri Co, Ltd, of Switzerland, is a manufacturing firm, but cannot be licensed to do business in Michigan. Brown Boveri of New York, a Swiss firm subsidiary, is not a manufacturer, but is licensed in Michigan.



MARKET ANALYSIS is important to determine sales potential, C. K. Fennell, GE (right), explains to (l to r) J. F. Gaskill, Philadelphia Electric; H. T. Axford, Scranton Electric and PEA Industrial Committee chairman; and John M. Orr, Duquesne Light and PEA president

Modernized Selling Urged

Keynoter at PEA Industrial Sales Conference says use of all techniques available is needed

"Modernize Your Selling" was the theme of the 1954 Industrial Sales Conference sponsored by the Industrial Committee of the Pennsylvania Electric Association at Skytop, Pa., May 13-14.

Some 135 utility industrial power and manufacturers' representatives heard keynote speaker R. T. Jones, Pennsylvania Power & Light Co, warn that "selling industrial power is going to need every technique at our command." He added: "We are not using half of what we have. We have to put back into use many of the things we have buried."

Seconding this view, Frank Gaskill, Philadelphia Electric Co, said that unless utilities sell in terms of advantages to the customer, the manufacturer and themselves, maximum results will not be obtained now or in the future. The only solution is to organize the electrical industry as a whole from the manufacturer through the distributor, the dealer and the contractor in order that every recommendation and every sale made is as nearly economically correct as is humanly possible in terms of the customer's advantage.

It is as much our right as our duty to do what we can to keep the economic system of this country operating smoothly, J. H. Jewell, vice-president of Westinghouse Electric Corp, told the conference. American business enterprise is now the vital factor in the well-being and security of a large part of the world, he said.

Our economic system will neither falter nor fail if we Americans treat it properly, he said.

F. F. Dickmann described West Penn Co's promotion of mass selling low frequency heating of steel billets. He said that it was highly successful because the company:

1. Tested the customer's interest in the subject.
2. Persuaded customers to contribute to the meetings.
3. Planned a campaign to get out to the right people.
4. Secured good publicity.
5. Presented dramatic demonstrations.
6. Enlisted cooperation of other utilities.
7. Is conducting a follow-up.

Mass sales promotions do not reduce the number of sales personnel needed, according to G. T. Perley, Pennsylvania P&L. In fact, Perley said, these promotions increase the number of personnel required because,

(*Continued on page* 264)

Towers Rise at British A-Plant

Eight 80-ft-high steel units to link reactors, turbines at Britain's pioneering Calder Hall station in Northumberland

LONDON (McGraw-Hill World News)—Eight steel towers, each 80 ft high, now under construction at the Renfrew works of Babcock & Wilcox (entirely separate from its U. S. namesake), will link the atomic reactors and the turbines at Britain's first atomic power station at Calder Hall, Northumberland.

Each tower consists of a heavy steel shell through which hot, pressurized CO_2 circulates continuously from the reactor. Inside the towers are many hundreds of feet of steel tubes arranged in sections through which water circulates and is converted into the superheated steam for driving the turbines, which in turn drive the generators.

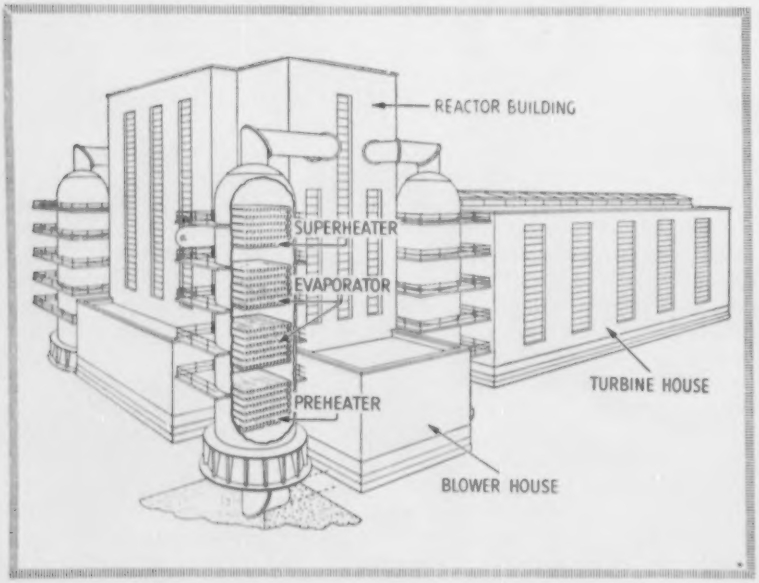
The most striking external feature of the power plant is the absence of conventional chimneys. There is no flue gas or smoke to get rid of, and the soot and odor usual at a coal plant are absent. There are, however, short stacks for venting cooling air.

Reactors . . . Calder Hall will have two heat producing reactors, each with four steam raising towers. Heat generated in the graphite moderated uranium reactors will be conveyed to the steam plant by CO_2 under high pressure. The gas will give up its heat to the preheating, evaporating and superheating coils in the steel towers. After losing its heat charge, the CO_2 will be recirculated by powerful blowers back to the reactor where it will be reheated and the cycle resumed.

The system will use a double-pressure steam cycle to get maximum efficiency from the comparatively low temperature (compared with conventional furnaces) of the gas entering the steam towers. Each tower contains, in effect, two separate sets of steam raising equipment: There are separate high-pressure and low-pressure economizer, evaporator and superheater sections, each with its own drum and feed pump. The turbine plant will have a low-pressure section which will receive live steam directly, as well as steam already expanded in the high-pressure blading.

Heating Surfaces . . . All heating surfaces are of stud-tube construction to provide extended area for obtaining the maximum heat transfer within the towers. As leakage of water or steam from the internal heating surfaces into the coolant gas would contaminate the reactor itself, there will be no joints inside the pressure shell except those which, once completed and thoroughly tested, will not be broken during the anticipated life of the plant. The whole coolant gas system must withstand its operating pressures without leakage.

The generating capacity of the station, although not officially announced, is generally estimated to be approximately 50,000 kw, or 25,000 kw per reactor.



Private Coosa River Plan Is Approved by House

Private development of the Coosa River by Alabama Power Co has been approved by the House. The unusual bill would suspend the Coosa River development authorization of the Army Corps of Engineers—contained in the Rivers and Harbors Act of 1945—to allow Federal Power Commission to issue a preliminary permit applied for last November by the utility.

Army Engineers and the Alabama delegation in the House worked together on the drafting of the bill. Under it, the Alabama Power Co would be required to complete a series of five dams and power plants within ten years after obtaining a construction license from FPC. According to the power company's board chairman, Thomas W. Martin, the five plants would have an ultimate capacity close to 360,000 kw. Construction cost of the five projects is estimated at about $100 million.

The legislation specifies that the dams shall include basic provisions for future construction of navigation locks and that the license shall require the maximum flood control storage that is economically feasible—but not less than that lost by displaced valley storage nor less than could be provided by the presently authorized federal multipurpose project at Howell Mill Shoals.

As insurance on these points, the bill requires that the Chief of Engineers review any plan submitted by the power company to FPC.

Prospects are considered fair for Senate action at this session on the bill, leading to enactment before Congress adjourns.

More news on page 248

Quinton Charts EEI's Course for Year Ahead

President pledges continuation of program to reduce U. S. activities in power field

The electric industry will continue its program aimed at eliminating unnecessary reports to regulatory bodies, reducing governmental activity in the power field, and making information available to the public about the industry. This is part of the general program for the ensuing year of Harold Quinton, newly elected president of Edison Electric Institute, announced at the closing session of EEI's 22nd Annual Convention at Atlantic City, held June 1-3.

He also said that the industry would continue "to unmask and urge removal of the supports of government power —tax exemptions, selling power from federal dams far below true cost, and the un-American preference clause to the favored few."

Costly Paper Work . . . In connection with unnecessary reports, Quinton pointed to the costly requirements for registration of securities. Investor-owned utilities, he said, have filed registration statements at least once, and a great many of them, an average of twice annually for a long period of years. He declared: "The greater part of these repetitive filings are simply additive to the cost of money and serve little or no useful purpose in the protection of investors, or otherwise."

Private enterprise, he declared, "rather than governments, should undertake the generation, transmission, and distribution of any related electric power development."

Individual companies and EEI, he said, will continue to make available to the American people full information on costs, return on investment, rates, and power capacity, etc.

(Abstracts of speeches delivered at the convention begin on page 100).

Quinton, first Pacific Coast electric utility executive to hold the EEI presidency, has been vice president of the institute. He was succeeded in the vice presidency by Harllee Branch Jr, president of Georgia Power Co.

Quinton's election as chief of EEI follows by a month and a half his election as president of Southern California Edison Co. He became top executive officer of that company in April, after having served as executive vice president from 1948. His association with the company began in 1942, when he was elected vice president in charge of finance. Formerly, he was a partner for 16 years in Arthur Andersen & Co, certified accountants. Prior to this association, he was with the U. S. Treasury Department.

MATTHEWS VALOR award winners James Steeley, Jr, and Robert Wagner, Pennsylvania P&L, get citations from C. L. Matthews. H. H. Hoygaard, Portland GE, was the other winner

Fire and Explosion Heroes . . . The 1953 Claude L. Matthews Valor Award was won by employees of Pennsylvania Power & Light Co and Portland General Electric Co.

PP&L's pump room attendant James E. Steeley, Jr, and instrument man Robert L. Wagner were cited for exhibiting "courage and fortitude far beyond the normal call of duty" when fire broke out in a hydrogen control cubicle at one of the company's plants on Aug. 31, 1953.

Portland GE's station operator H. H. Hoygaard received his Valor Award for risking his life on June 15, 1953, when an internal failure caused the explosion of a turbine.

Reddy Kilowatt Award . . . For the second consecutive year Arkansas Power & Light Co walked off with the Reddy Kilowatt Annual Report Award (see page 118 for details).

REDDY KILOWATT ANNUAL REPORT award goes to C. Hamilton Moses, Arkansas P&L. Onlookers are William Lyons, New York State E&G and Charles Oakes, Pennsylvania P&L

WALTER H. SAMMIS, President, Edison Electric Institute gives . . .

EEI's Answer To Federal Power Proponents

Propaganda has been for years disseminated skillfully, often by government officials, creating the fear of impending power shortage, the impression that investor-owned companies will be unable to provide adequate power for national defense, or fostering the fear that the job of supplying the nation's power requirements is too big for private industry; that the Federal government must step in.

Experience has taught us to regard all such statements with concern because they are designed to disarm the proponents and supporters of the free enterprise system. It is our duty to our customers, employees and security holders, all of whom pay Federal taxes—indirectly through their electric service bills and directly through income and other forms of Federal taxes—to inform them of the real facts and harmful effects of this propaganda.

Roughly, it appears that the bait used to extend the government's power operations was to price power at about one-half what the investor-owned utilities charge for the service, which was also about one-half of its true cost to the government. The latest REA purchased power report (for the fiscal year ended June 30, 1952) is one example of this. It shows that the various Federal power agencies sold electricity to the REA co-ops in fiscal 1952 at an average price of 4.9 mills a kwhr and that the

price charged the co-ops by the private companies averaged 8.6 mills, whereas the average price charged the co-ops by REA generating stations was 13.7 mills.

You never see a government-owned power business or any other government proprietary business that is divorced from big subsidies. Stripped of subsidies it could not obtain or hold business.

Federal taxes are the big differential, the big subsidy. Customers of investor-owned utility companies pay 13.7¢ of every dollar collected from them in their electric service bills for the support of the Federal government. Customers of government power agencies on the other hand are exempt from paying through their electric bills this share of the cost of the Federal government, as government power operations do not pay Federal taxes.

Another 8.6¢ of every dollar electric light and power companies collect from their customers goes for the support of state and local governments, but government power agencies make little, if any, payments in lieu of state or local taxes.

You may recall the cry that went up at the time TVA took over the generation and transmission facilities of private power companies in the State of Tennessee. Some of the people of Tennessee strongly advocated that Congress amend the TVA Act so that the authority would pay taxes on the same basis as displaced private enterprise had been doing. The proposal was opposed vigorously by the late Senator Norris, father of the TVA Act, who declared (Congressional Record of April 13, 1939):

"A proposal from a great association of Tennessee says, in effect, 'Let the TVA property be subject to taxation the same as everybody else's property.' On my desk now there is a printed amendment intended to be offered which provides that all property of the TVA shall be subject to taxation everywhere under the local laws of taxation. If we go to that extreme, Senators can see that the TVA would be out of business in three months."

TVA was therefore required to raise temporarily its percentage rate of payments in lieu of taxes, but present payments are far from being comparable with what the electric utility companies pay. In 1953, TVA's total payments in lieu of taxes were 3.26% of revenues. Compare this with the 8.66% to state and local governments paid by the investor-owned companies. The distribution systems in the TVA area also pay some "in lieu of" local taxes, but the total for the combined operation, TVA and its distributors, is only 4.95%. A comparison based on mills per kwhr sold is even more striking. Electric utilities pay 1.7 mills per kwhr to state and local governments, TVA pays 14/100ths of 1 mill and the combined TVA-distributor operation pays 38/100ths of 1 mill. And of course none of them pays Federal taxes.

Government Securities Also Tax-free

In some instances Federal government power operations escape paying interest or return on the capital supplied by Congress to build power facilities. A few weeks ago, when the House Appropriations Committee proposed that TVA pay interest on the monies appropriated by Congress, TVA supporters staged a frantic and successful pressure drive to kill the proposal, even though the suggested rate of interest was lower than the full cost of money to the Treasury.

The securities issued by government power projects other than Federal are also free from Federal income taxes and in many instances from state income taxes.

To sum it up, if the Federal government with the monies of its citizens is going to compete with them in business, certainly it should be on an equal basis with investor-owned business, charging to such business the true costs of doing business, and not base its prices on subsidized costs at the expense of the customers of the investor-owned utility companies and other taxpayers.

The Federal government's power operations on a true cost basis cannot match our record. If the government included all costs in its prices for power, in practically every case the resulting prices would be greater than the market value of power in the same area that is or could be produced by electric power companies under the regulation of public service commissions controlling rates.

Utilities' Record Cannot Be Matched

Never at a loss for an issue, the propaganda theme more recently emphasized by the public power advocates is that both private enterprise and the Federal Government are needed to develop power—that the job can best be done by both. This in itself is somewhat of a concession for them to make. But even this contention that both are needed is demolished by the remarkable record of the private power industry both during and since World War II.

A specific example of recent misleading propaganda is the preposterous claim that, if it had not been for TVA the production of the atom bomb might have been delayed two to four years and were it not for TVA's ability to produce an extraordinary amount of power for production of our own atomic bombs, atomic bombs would have been dropped by now on the United States.

The facts are that the kwhr sold by TVA to the AEC at Oak Ridge during the fiscal year 1944-45, the peak year of war production, were 6/10ths of 1% of the total kwhr supplied by the electric light and power industry, and the TVA's sales to all Federal agencies including the AEC during the same year were 8/10ths of 1% of the total supplied. During this same period the electric light and power industry had a reserve of generating capacity of 20%.

TVA actually delivered 158,500 kw to Oak Ridge during the month of December 1944 which represented approximately 3/10ths of 1% of the generating capacity of the electric light and power industry. By June 1945 this percentage had reached a little less than 6/10ths of 1% and by 1949 the kw under contract to Oak Ridge represented 4/10th of 1% and as of the present time represent approximately 1.8% of the industry's generating capacity.

A high-ranking Federal official, who had to deal with power supply during World War II, made the statement that "power was never too little, or too late."

Another favorite rallying cry of public power advocates is "power shortage." In spite of all the propaganda put out about it, this country has never known the meaning of the words "power shortage."

During World War II about 750,000 kw of generating capacity was taken by the Federal Government from investor-owned utilities, some going to Russia, some going to industrial operations in this country for self-generation and some going for the atomic energy program at Oak Ridge. A portion of this capacity was obtained by removing

machines from the foundations in utility companies' plants in this country, the remainder by diverting equipment which the utility companies had on order with manufacturers. In addition about 1,250,000 kw of generating capacity, which the utility companies had on order with manufacturers, were concelled or deferred in manufacture until after hostilities, thus delaying by several years their completion and installation to and even beyond the time when the demand for power was mounting in the rapidily expanding post-war civilian economy.

Shortages Occasional and Local

And yet despite this diversion of equipment, materials and manpower, thanks to the ingenuity, the foresight, and the engineering and operating know-how of the people who man America's power companies, only occasionally have local power shortages materialized and then for relatively short periods in particular areas. Usually, they have resulted from drought conditions in areas heavily dependent on hydroelectric power. The growing percentage of steam generation in nearly every section of the country, coupled with the effectiveness of power system interconnections, has rendered these occasional local deficiencies less and less likely.

The record of investor-owned electric power companies since the close of the last war in providing new facilities to meet the ever expanding requirements of the nation is probably unequalled by any other segment of our economy. Total investment in their electric facilities has increased from a little over $12.5 billion in 1945 to about $26.5 billion today. According to the U. S. Department of Commerce, expenditures for new plant and equipment for all private industries in the country since the war have amounted to slightly over $171 billion, which indicates that the electric utility companies' expansion accounts for 1/12th of the total. Construction expenditures of the investor-owned electric companies in 1954 are estimated to be about $3 billion—the highest of any year.

Last year there was installed by all segments of the electric utility industry (investor, co-operative and Government-owned) 10 million kw of generating capacity. At the end of 1953 the total generating capacity was 95.5 million kw and reserves of generating capacity exceeded 17.6%. The additions scheduled this year are about 13.7 million kw and for 1955, 11.6 million kw. Electric company managements will build generating capacity even more rapidly if warranted.

It is obvious from the above that there is no need for the Federal Government to appropriate money now, or at any other time, to assure an adequate power supply for this country. The Federal Government, after spending many billions from the Treasury and taxing American business and the public to supply this money, is generating about 11% of the nation's power production, including generation by industrial plants for their own use. Twenty years ago power production from Federal plants was only 3/10ths of 1%. At that time, and for years before, and again today the big job of the utilities was and is to find and create non-subsidized markets for the electricity from the plants they have built and are building.

It should be plain that if the full responsibility were left to it, private enterprise would continue to provide this country with an ample supply of power for all needs at reasonable rates as determined by regulatory authorities. It's just that fundamental and simple. Where there has been any question on this point, it has arisen because the Federal Government has divided and mixed the responsibility for power supply in certain areas and by its unfair taxation policy and its failure to charge its customers the full cost of producing power, has introduced an element of fear. There is genuine cause for the fear we have of the destructive force of Government taxation.

In the case of economically justifiable multi-purpose water resource projects, the best over-all solution will come when private enterprise is given full opportunity to participate in the development with an equitable distribution of responsibilities.

The Meaning of Light's Diamond Jubilee

CHARLES E. WILSON, Chairman, Jubilee Sponsoring Committee

The meaning of Light's Diamond Jubilee is crystallized in the slogan of it. This proclaims "Light for Freedom—Power for Progress."

In spreading the story of what our industry means to the world, we have a peculiarly appropriate asset in the word "light" itself. "Light" has always symbolized freedom, as it does in our own Statue of Liberty, lifting her lamp beside the golden door. "Light for Freedom"—it's questionable whether even a man of Edison's talents could have overcome the problem facing him in an environment which restricted his freedom of thought and inquiry and which channeled his thinking into dogmatic, politically dictated patterns.

"Power for Progress," the other half of the Jubilee slogan is a story that is as familiar to us of the electrical industry as the palms of our hands. Our problem is simply to make it equally as familiar to our fellow citizens.

It should be our hope that the Jubilee will prove to have an uplifting effect, helping to remind people the world over of the progress that a peaceful nation can bring about with

the aid of electric power. If our efforts do achieve this result, it could not come at a better time. In many areas of the globe we find a defeatist, Munich-like attitude prevailing. Beset by problems which seem unsolvable, many men are running out of hope. They are in a mood for compromise—even though similar compromises in the past have proved to be little more than complete surrender.

The bitterly ironic aspect of this situation is that the sinister force of international communism bases its outward appeal on the promise of better things for the masses of the people. It is up to us to keep working to prove that the way to achieve this goal is by the methods that have come into our lives during the 75 years of the electrical industry. It was a marvelous force that Edison released to the uses of mankind. The further we can extend the benefits of that force, the more chance we have of seeing Light's Centennial celebrated with genuine fervor throughout a peaceful and prosperous world.

Selling for the Future Load

SHERMAN R. KNAPP

President,
Connecticut Light & Power Co

When we talk of selling for the future market, in our company, we are concerned with more than kilowatthours. We are thinking in terms of creating customers, rather than sales, and of developing more high-use customers who because of their investment in electric living and their reliance on it have more in common with their power company. It seems reasonable to believe, also, that the high-use customer, with a higher mutual interest, is more likely to share the same beliefs in economics. At any rate, we love him dearly, and our sales thinking is hinged on winning more like him.

I have been afraid sometimes that there is a tendency for us to become complacent in the false belief that our industry's future growth is in no way related to our policies and efforts. I am not going to argue the point, but I would like to say with all solemnity that I know of no product, no cause, no idea which has won public understanding and acceptance without that force of active belief variously called selling, or merchandising, or promotion.

The kind of selling I mean is an attitude—a company attitude in which everything the company is and does contributes to its selling; in which everything the company sells contributes to the company and the economy. Mainly this means selling ideas. Selling, in this sense, is nothing separate and apart. It has its techniques and tools, to be sure, but above all it must express a total belief and approach. It includes the company's standing as a citizen in its community, its work to improve and serve that community. In our company, it includes the yellow trouble trucks and the linemen's helmets with the block letters "CL&P" as well as the company's successful efforts to create the Connecticut Development Credit Corporation. It is the newly remodeled stores in the old towns, and the manners and public helpfulness of the meter readers. It is advertising and a tree control program. It is also salesmen.

I have come to believe that selling is a process, a never-ending development of a relationship between buyer and seller that is continuously and mutually rewarding. What the oldtimers called "the slow pitch," the steady push for tomorrow's business. Our industry must assume the kind of corporate attitude in which planning sales has equal footing with planning for generating capacity we now figure so carefully to fit economic growth.

If we will devote to "selling for the future market" the same care for costs we devote to the manufacturing of electric power, we will be able to compete successfully in the total market for that grand prize we all seek—the satisfied customer—the people on the far side of the meters whose educated desires make the hands go 'round. The kind of people whose attitude adds up to—and makes possible—the future.

System Engineering Faces A Challenge

E. H. SNYDER

General Manager,
Electrical Department,
Public Service Electric & Gas Co

With little prospect of relief from high costs, the major hope for maintaining earnings from here out lies in engineering for an ever greater economy in plant and operating expenditures. Today's level of economy has been attained by utilizing larger and more efficient units, by loading plant more heavily, by careful long range planning, and by meticulous design and operation.

But what of the future? Can we combine the experience of the past with the materials of the future so that we may profit as we grow? That is the challenge industry engineers face.

In steam generation the trend towards higher temperatures and pressures and the use of reheat has resulted in machines operating at 2,300 psi, 1,100 F with reheat to 1,050 F and having heat rates of 9,000 Btu/kwhr. Manufacturers working with one of the large utilities are designing a unit to operate at 4,500 psi and double re-

heat with a heat rate of 8,400 Btu/kwhr. Other heat cycles are being studied, including use of the gas turbine in combination with the steam cycle.

The trend towards larger and larger units continues. On order are machines of 250 Mw and cross-compound units of slightly higher rating, and machines of 500 Mw are in prospect using hydrogen or liquid-cooling generator windings.

With larger generating units has come a change in thinking as to maximum capacity installed in an individual steam station. Some older metropolitan stations have already approached the 1-million kw mark, and new stations of even greater capacity are being built in connection with the supply of power to the Atomic Energy Commission.

In the field of transmission need for higher voltages is being felt. One large 330-kv system, comprising several hundred miles is well under way, and other lines of 330-350 kv are being built elsewhere. Some metropolitan systems with 110-138 kv backbone lines are finding them inadequate. Here studies show lines of 220-345 kv must be superimposed on the present system.

An immediate problem in use of underground cable is the improbability that a single cable of 110-138 kv can carry the full output of one new 250 Mw generator—should occasion arise. Hence there may be some short runs of 220-kv cable in the near future.

In subtransmission and primary and secondary distribution major problems are similar to those in generation and bulk transmission. To increase circuit loading, higher voltages have been considered in each segment of plant. Subtransmission voltage has been raised to 69 or even 138 kv; a number of companies have adopted 12 kv for primary distribution.

Consideration is being given to higher secondary voltage as use of large appliances grows in homes. Recently, office and industrial buildings have been connected where load warranted higher secondary voltage. The two problems are closely interrelated because the question of increasing lamp and appliance voltage from 120 to 240 or 265 ultimately must be answered in each case.

These are the problems that lie ahead in power system engineering. We must continually re-examine our practices, for what we did yesterday will not suffice tomorrow. For what lies ahead, we need new ingenuity and new boldness in engineering.

Forecasts Show New Growth Problems

WALKER L. CISLER President, The Detroit Edison Co, and Chairman, Electric Power Survey Committee

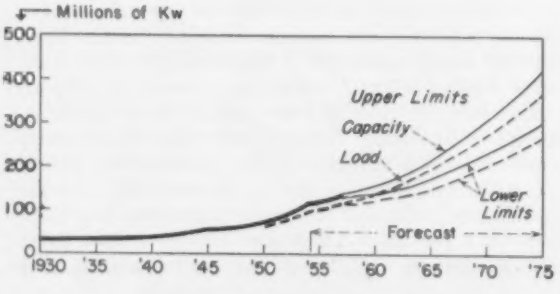
The electric power industry has an unrivaled opportunity and a deep responsibility in the years ahead. The last quarter of its first century holds great promise of continued advancements.

Power consumption is expected to double by 1965, and continue its growth at an undiminished rate. The industry must meet peacetime requirements and maintain reserves for national emergency. Capacity additions must continue at a high level, surpassing today's achievements after 1965. And it must lead in developing atomic power reactors to avoid unrealistic and wasteful steps.

Power Needs Continue Upward . . . Today we have, spread across our country, interconnected power systems that serve more than 50 million customers. Before the end of this year they will have generating capability well over 100 million kw. Our concern in recent years has been keeping abreast of the rapidly increasing need for power.

The Electric Power Survey Committee, organized by EEI in 1947, has issued 15 semi-annual forecasts, each for the four years ahead at the time of issue. But this year it has looked ahead to 1975. It foresees a peak load of at least 262 million kw, up from 81.6 million in 1953. Rate of growth assumed is only 5.4% compounded, compared with 7.8 percent for the past 15 years. And a 6.8 percent rate projects to 367 million in 1975.

Very large amounts of power in the metal and chemical industries, space heating, and expected population growth with improved living standards can easily bring these peak loads. And the values forecast by experienced men of the industry point out the responsibilities which the industry must assume. Our country's future depends heavily upon a continuing adequate supply of power.



Capacity Margin Essential . . . Power systems must have a margin of capacity to provide for equipment outages, system control, and unforeseen loads. This "gross margin" has varied from 6.6 to 17.5% in recent years. But 15% for the country as a whole assures little likelihood of power curtailment except in event of adverse hydro conditions in areas largely dependent on hydro generation. Applying this 15% margin to 1975 load forecasts indicates capacity requirements between 301 and 423 million kw.

Required annual capacity additions range upward from an average between 7 and 12 million kw for the next decade up to nearly 24 million before 1975. Best year has been 1953 when 119 thermal units added 8.7 million kw and 54 hydro units added 1.5 million. This year and next promise the impressive total of 323 units and 25.5 million kw. New requirements through 1965 should not be overly difficult. But the second decade will need adequate advance planning.

Current orders for steam generators and turbines to be shipped after 1954 occupy only a small part of manufacturing capacity. Personnel reductions have started. This could create again the tense situation which occurred in 1950-52, because it is almost certain that thermal units will constitute 90% of installations in the next quarter century.

Atomic Reactors May Supply 65 Million Kw . . . It is almost certain that several large atomic power reactors will be built within ten years. Their total capacity may reach one or two million kw. Many additional atomic plants should come into service in the years 1965-1975. If one-third of new capacity added during that decade uses atomic fuels, then their total might reach 40 to 65 million kw by 1975.

Conventional fuel and hydro plants will still serve out their normal economic lives, because these atomic plants, if used to the maximum for base loading, could generate less than 25% of needs. But nuclear fusion may supplant fission as the atomic process.

Scientists tell us that no "direct-conversion" device discovered up to now holds real promise. The strontium battery produces only one-millionth of a watt.

Transmission and Distribution Voltages Up . . . It is likely that 400-kv transmission will become reasonably common. And many lower voltage systems will adopt higher voltages. This type of expansion permits great economy in that the new lines provide the main transmission while the existing lines become subtransmission.

In distribution, higher feeder voltages are used today and the possibility of 440/220-v service for residences, farms and small power customers is being discussed. These changes will come in the effort to keep ahead of power requirements.

Organizations Need Ingenuity . . . Power systems must assume increased responsibility to the public. Competent personnel must be recruited and trained. Lines of authority must provide efficient and effective operating procedures. Organization will require more top management attention.

Finances will be a continual concern. Expenditures of nearly $2.6 billion in 1952 and $2.9 billion in 1953 were 75% financed from new securities. Atomic plants require greater investment. It will be a challenge to maintain a satisfactory financial condition to encourage the purchase of securities by investors.

Customer Relations Today

HENRY B. SARGENT,

President and General Manager, Arizona Public Service Co

For good customer relations to get the friendship, support, and response of our customers, we need a sound philosophy, efficient operation, a better product at low cost, an informed public, faith, and a willingness to work.

We need a sound philosophy. We must convince customers that our conduct is in the interest of them and the nation. We must be willing to finance new facilities. We should take a strong stand in favor of sound regulation.

We should promote research. Over 55 of our companies are spending millions on development of atomic energy. We should improve load factors to lower cost of our product. Steps should be taken to explore solar energy.

We need efficient operation. Any business financed by private capital must make a profit. We must continuously introduce a better product at less cost. Our plants have increased efficiency, and transmission voltages have been raised. We must have a cost conscious program.

We need an adequate construction program and a sound money program to support a balanced budget. We must maintain financial integrity. A sound sales program is a must. Every effort must be made to help our customers make effective use of our service. And we need people to operate these services.

Customers must know about the job we are doing. Before 1932 we made 19 million new residential customers and decreased cost from 16¢ to 6¢. But in 1933 70% of elections favored municipal ownership. Then we started a program. In 1953 none of the 23 elections favored municipal ownership.

We must do the same on a national scale. In 1956 federal power will be about 15%. We must join with other organizations—railroads, farmers, doctors, lawyers, and press—who have the same basic interest in preserving private enterprise.

We need faith in our government. No country in the world offers its citizens the opportunities, responsibilities, and freedom that we enjoy.

We need faith in our industry, its future, opportunities, and challenges. And we need faith in the individual, in ourselves. This nation was built on the rights of the individual. Taxing those able to pay to give to those less able to pay is socialist theory—robbing Peter to pay Paul—legalized robbery.

We need willingness to work. We must be willing to put more into a job than we get out of it, to give an honest day's work for an honest day's pay.

People Organized and in Action

C. HAMILTON MOSES, Chairman of the Board, Arkansas Power & Light Co

Hesitantly do I try to tell you the little story of one little company in an inland state . . . [In Arkansas] you find every type of soil and of climate and of people and of attitude, and of raw resource that you find anywhere in this nation. Yet you find in that little inland state the lowest set of statistics by which you measure the economy of a people that you find anywhere in the nation except Mississippi. . . .

Why? . . . Why was that with all those potentials, yet so low in the scale? Came 1944 and there was one morning flung to the American people the most far-flung proposed public power system this nation has ever known anything about, known as the Southwestern Power Administration, the Interior proposing to parallel, in effect, every line and 770,000 kw of hydro power in our territory—not going to a new customer, not to a new community. . . .

. . . We got our group together, since we realized we had to make the public believe that we could do a better job for them than the government ownership. . . . If we couldn't do a better job, maybe the federal government ought to come in and do the job. . . . We said, "Let's go out and take some kind of program to the people in the communities we serve. Let's challenge their imaginations."

They accepted the challenge, were ready to go, and we looked around for the program. This great institution that you so loudly boast about, called private enterprise, in all its history hadn't enough interest in the communities which you served to even "born" a community building program which the average community could get their teeth into, and our boys down yonder in little Arkansas had to "born" a program of their own. They call it "The Build Your Own Home Town Plan". . . .

Morning, noon, and night we go to every community, call the leadership of the community in around the table to discuss our own common problems, and in an effort to enliven the imagination, maybe lift morale, maybe just a wee bit inspire the leadership of those communities to get them to get out and do what they ought to have been doing all the time and what we could not do—visualizing sometimes that 50,000 people in those communities would be organized and with a plan and at work, and that those 50,000 people would be building customers and selling kilowatt hours for us just as much as if they were on our own pay roll.

Rates and Securities Regulation by the FPC

JEROME K. KUYKENDALL Chairman, Federal Power Commission

In the five-year period ended on Dec. 31, 1953, the total new corporate financing in the United States amounted to $31.7 billion, according to the "Commercial and Financial Chronicle." Utilities accounted for $14.6 billion or 46% of the total. This is a splendid showing. It shows what we know to be a fact, that there has been no dearth of capital to finance the great expansion in utility facilities and services during this period.

The record of the electric utility, and of the natural gas pipe line business as well, has been an excellent one in the last decade or so. During this period the investment rate base had its greatest recognition in actual practice. The method has had an adequate test in a period of rather severe inflation. During this period electric utilities have prospered, and their rates have been remarkably firm even under great inflationary pressures. In my opinion, the record shows that the investment rate base method has worked well. Thus I come to these conclusions:

1. A reasonable standard for the determination of just and reasonable rates for utility service is required for the protection of the utility, its investors, its consumers, and the public generally.

2. The most appropriate standard at this stage of the development of the regulatory art is a fair return on the net investment in properties used and useful in the public service, plus required working capital.

The second element in the rate standard is fair rate of return. The Federal Power Commission, in spite of statements to the contrary, does not have a set rate of return. It considers all the relevant facts before reaching a conclusion in a given case.

In our recent natural gas cases the rate of return we have found reasonable has ranged from 5½ to 6¼%. Because of the similarities of business, growth, and financing among these companies, I would not expect to find such differences in the financial facts and economic situations as would call for very wide variations.

The commission has been criticized for allegedly paying too much attention to the cost of money in arriving at a fair rate of return. Cost of money, while not the exclusive measure of the rate of return, is certainly a necessary ingredient thereof. Obviously, no utility could prosper if it is not permitted to earn its reasonable cost of capital including fair amounts for the common equity.

Equality Not Preference

GEORGE M GADSBY

Chairman, President
Utah Power & Light

A few basic facts are necessary in order to view in proper perspective the development of the preference clause and the discriminatory practices conducted in its name. To begin with, electric service . . . is entirely local in so far as the consumer is concerned. . . .

A second basic fact, if discrimination be present at any point in the electricity supply system, the discriminee is the ultimate consumer.

A third generalization, when the consumers, 80% of whom are now cut off from . . . federal power sold at low prices, wake up to the injustice being done them, the fight of the investor-owned companies will be won. . . .

Considering the minority status of the favored few, it is amazing how preference in selling federal power has taken root and grown. Perhaps one answer is found in the fact that the customers of the PUD's, municipalities and co-ops are political entities and can operate as such. The customers of the investor-owned companies are not. . . . Any corrective approach must, therefore, follow some other course which will be of interest to the customer as a citizen and taxpayer. . . .

There are definite principles which can be vigorously advocated and whose fairness will be appealing:

The deficit in the power bill not paid by the preference customer—or by TVA—is made up out of tax money paid in part by the people of your community. . . .

The low price of government power due to tax freedom and inadequate cost allocations is the motivating force in the hands of the champions of preference and the type of public ownership whose target is a socialized power system. The antidote to this is fair play in taxes.

For the sake of all taxpayers . . . all power should be sold at market value or worth. . . . The preference clause as presently interpreted should be eliminated from federal statutes so there will be equal opportunity under law for American citizens everywhere to share in the benefits which may come from projects for which these citizens pay.

Prospects For Use of Atomic Energy

DR JOHN R DUNNING

Dean of Engineering
Columbia University

It is clear today that atomic power is in a rapid state of flux in that there are various competing types of reactor systems for developing power. The solution lies in actually building and testing these types of plants in order to get the basic experience data on capital and operation costs, operating life and all the factors that enter into planning.

Almost everyone agrees that within the next five years we will see a fair number of these test-type atomic power plants built. The Commission's own five year program represents one program, but if industry is going to accept its proper responsibility in this picture, the ball will be placed squarely into the hands of the electric light and power companies. It is going to take a good deal of courage and a good deal of enthusiasm and some cold hard cash to see this program through.

If the industry does not recognize its responsibility and its opportunity in this field, then it is equally clear that the public power groups will almost certainly carry the ball on one hand and the Government will be forced to virtually subsidize it and carry it through on the other.

If the industry rises to this opportunity in these next few years with sound and well conceived ventures, it is equally clear in the actions of some of the various public service commissions that they are going to take a friendly attitude toward including the atomic power cost as a proper item in rate base considerations. While opinions may differ from state to state about this, the encouraging attitude of a number of state public service groups is a welcome sign that government and private industry can deliberate in the mutual interests of both.

Weapons Program Unaffected by Atom Power

ROBERT LEBARON, Assistant to Secretary of Defense, Washington, D. C.

The building of civilian atomic power plants will not impair the supply or production of atomic weapons.

Fuel costs for atomic heat will steadily decrease. The cost of building new reactors will decrease. Both these activities can be carried on without interference with the weapons program.

As our stockpile of fissionable material grows, our reactor engineers have increased freedom of design. The atomic fuel which we use in these power plants does not need to be expensive. In our first reactor designs, it was necessary to use a sizeable amount of expensive fissionable material in order to develop the combustion of the cheaper garden-variety uranium. Now that we have learned more about the technology of reactors, we find ways in which we can use more of the cheaper material and less of the expensive material. Soon, we will reach a stage where the use of the expensive material will be somewhat analogous to that of lighting a match to start a roaring wood fire.

These facts stand out:

1. Atomic weapons and peacetime nuclear power are not rivals. Both can and should be developed now.

2. Our country already possesses a multi-billion dollar atomic inheritance in manufacturing facilities and trained personnel.

3. The future power potential of this new industry is enormous.

4. We must go forward. We must use the American pattern which has proven so successful in all our industry. Americans understand competition. We have never had any sympathy for monopoly—even government monopoly!

5. All-out atomic strength stems from one basic atomic activity—the production of these new neutron-source materials. As this industry grows and our basic industrial atomic capacity grows larger our reservoir of national strength for atomic weapons and peacetime nuclear power will both emerge from the same parent commodity.

It is my conviction that atomic weapons and peacetime nuclear power are partners in our struggle for survival. Again, atomic bombs and peaceful atoms are not rivals. We need them both. We need them now. We can have them both—if our American system of free enterprise can be organized and stimulated to carry out the job.

Facing Up to the Cost Problem

STUART CAMPBELL Partner, Booz, Allen & Hamilton

In appraising the different cost control problems of the next expansion period, utilities may want to keep these points in mind:

1. Review the forecasts of growth over the next 10 years to see the extent of the probable effect on management planning, and the timing of it.

2. In the light of that forecast, take a new look at your plan of organization. Can it be readily expanded to handle the added volume of business, or will it require some basic changes? Do you need to create a different divisional set-up?

3. As you visualize changes in the organization structure, will they make it more difficult to determine where the responsibility for costs lies?

4. As you develop organization changes and visualize the broader responsibilities of many positions, will you be able to match these job requirements with adequate information on operating costs, operating and capital budgets, and departmental and functional expenses?

5. Do your expansion plans take into account that the cost consciousness you are getting from a group presently working together may not be as easy to get from a larger organization and that the specific provision may have to be made for supplying it?

PANEL DISCUSSES . . .

An Appraisal of the Market for Long-Term Capital

Better Preferred Call Prices

GRANT A. MARTELL Second Vice President, New York Life Insurance Co

Life insurance companies as a group have been declining in importance as purchasers of public utility bonds. With declining availability of satisfactory new industrial loans and sooner or later a decline in mortgage lending, public utility bonds will probably be purchased in greater amounts by life insurance companies.

Pension funds are becoming increasingly important as purchasers of public utility bonds.

Life insurance companies as a group have been erratic purchasers of public utility preferreds. If more attractive call prices are provided for new issues and if insurance companies are allowed to reduce the fluctuations in asset value of preferreds by regulatory authorities, life insurance companies should become more important as preferred stock buyers.

The income tax burden of life insurance companies will cause such companies to give increasing attention to the purchase of public utility preferred stocks.

Some life insurance companies, including New York Life, are purchasers of small amounts of public utility and other common stocks. This will continue if the common stocks provide attractive yields as compared with other types of securities.

Future interest rates will move up as well as down depending on business conditions and employment in accordance with President Eisenhower's flexible monetary policy. For the balance of this year interest rates will keep within a fairly narrow range of present levels. Over the longer term there will not be any great scarcity of investment opportunities for institutional investors because of the huge sums that will be required to finance the further development and utilization of natural resources, to provide for the sharply expanding energy and other needs and desires of a growing population and to provide an adequate defense.

Good Money Market

ALVIN J. SCHLOSSER Vice President, Blyth & Co., Inc

In summing up for the members on the panel "An Appraisal of the Market for Long-Term Capital," he said:

The bond market is on a favorable level so far as money costs are concerned. We would know of no reason why public utilities or other industries having current need for such funds should hesitate to enter those markets contemporaneously.

We think we are enjoying an exceptionally good preferred market as the market for preferred stock customarily goes. It is probably the least predictable and the most highly sensitive of all capital markets.

In our view, the stock market speaks for itself. It is at a very nearly historically high level. Nobody but an unreconstructed cynic, in my view, could doubt but what equity capital for public utilities is definitely, at today's level of the market, not only in ample supply but also offers very attractive rates for risk capital.

So that measured by the three principal markets for the issue of public utility securities, we think they are all highly favorable to the continuation of your construction programs and for financing in the normal course of business. We think it would represent good policy and sound policy, as and when you have need for money, to proceed to raise the kind of money which your individual structure at that time suggests as being appropriate.

Earning Trends Are Favorable

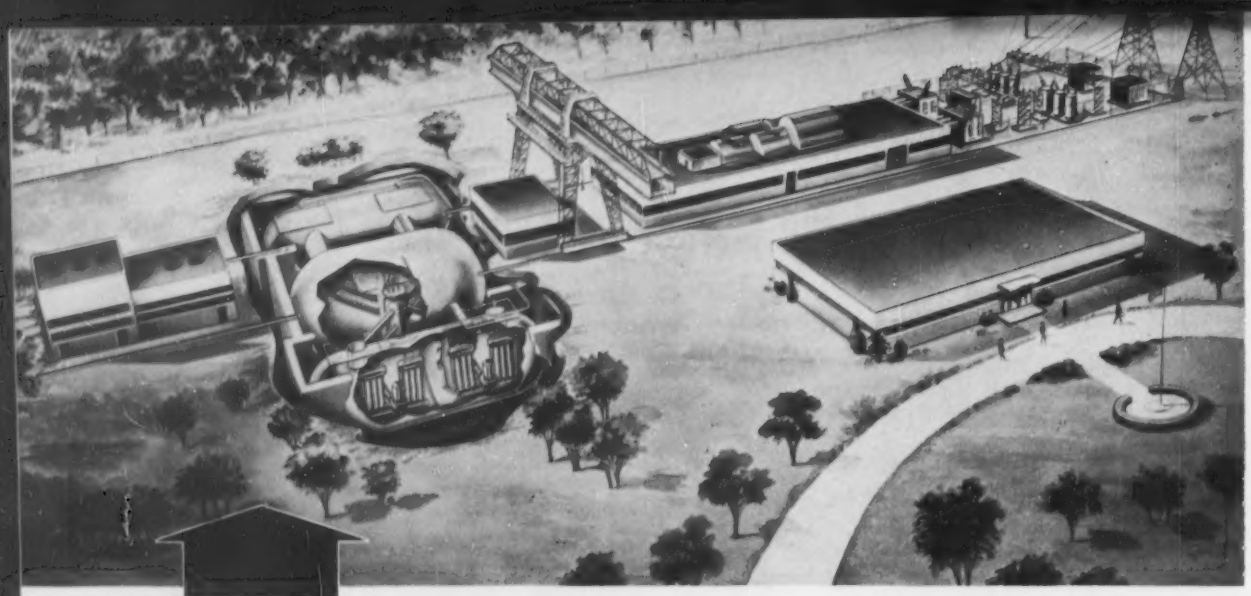
ROBERT S. DRISCOLL Partner, Lord, Abbett & Co

Here is the present outlook for electric light and power common stocks:

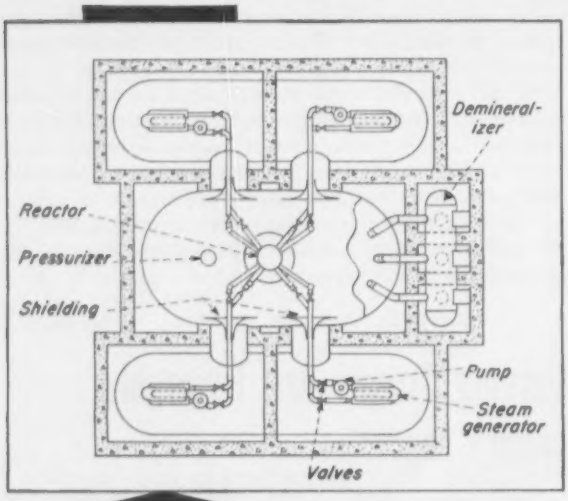
1. Earning trends generally are favorable.
2. The money market is favorable to new financing.
3. Companies operate in an atmosphere of greater confidence with respect to regulation than for quite some time in the past.
4. No immediate prospect of great commodity price inflation. This is favorable to the industry.
5. The only problem is that the market prices of utility stocks, to some pretty important extent, reflect the situation; the indicated returns on utility stocks today are less attractive in relation to the rest of the market than they have been during most of the past two or three years.

We still have a large holding in electric utility common stocks but we are taking a much more careful look at new commitments that we make at this price level.

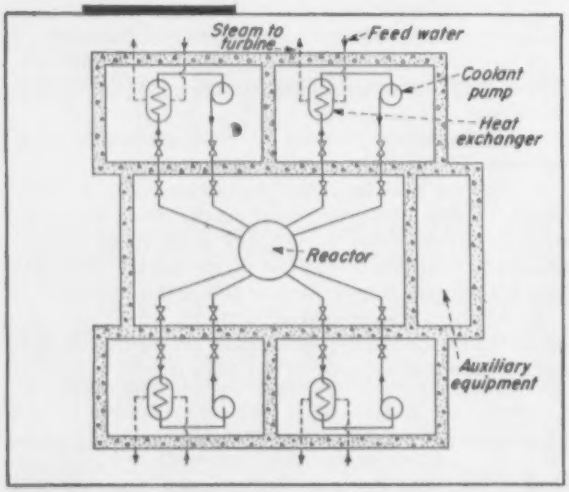
F. W. PAGE, Vice President, Tri-Continental Corp, was the moderator of the panel



Artists sketch shows first nuclear-powered generating station for utility service . . .



Plan view identifies underground reactor parts



Schematic shows how steam is generated

Duquesne Light

CHARLES H. WEAVER, Manager, Atomic Power Division, Westinghouse Electric Corp, East Pittsburgh, Pa.

Basic design of the first large-scale atomic power plant is already established. General specifications called for:

1. Use of slightly-enriched uranium for fuel in a reactor cooled and moderated by light water.

2. Extension of fuel element life between chemical reprocessings as long as possible.

3. Refueling with minimum shutdown period.

4. Simplified reactor control system.

5. Shielding with concrete.

6. Production of steam at 600 psi saturated or higher.

7. Generation of at least 60 Mw useful electric energy.

8. A central-station type steam turbine-generator.

9. Use of conventional types of steam, electric, and auxiliary systems.

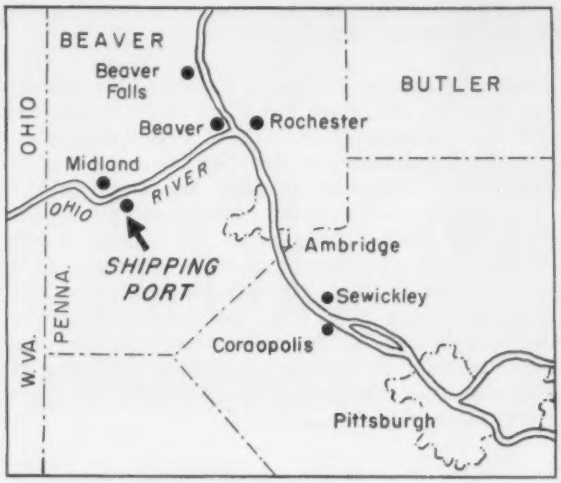
10. Retention of commercial standards for equipment.

11. Minimum plant construction cost.

12. Minimum plant operating cost.

Site for this PWR atomic power plant has been selected at Shippingport, Pa., on the Ohio River about 25 miles northwest of Pittsburgh. Here Duquesne Light Co will furnish the land, build the electric generating plant, contribute $5 million toward the reactor, and operate the overall plant at no cost to the government. Steam produced by the reactor plant will be purchased at rates ranging upward from 48.3¢/million Btu the first year to 60.3 the fifth.

Core Is the Crux . . . The reactor core will consist of a geometrical pattern of closely-spaced fuel elements. Heat generating material will be uranium containing a slightly



Located on Ohio River at Shippingport, Pa. . .

. . . in undeveloped tract outlined above

PWR Reactor Design Revealed

higher amount of the 235 isotope than natural uranium. More than 10 tons of uranium will be used in the first core. Fuel elements will be protected by a corrosion-resistant material designed to prevent coolant water from becoming contaminated with particles of uranium and fission products.

Fuel elements will be formed into a cylinder about 6 ft in diameter and 7.5 ft high. Maximum surface temperature of fuel elements will be less than 636 F, the boiling point of water at 2,000 psi. Maximum heat flux will be over 350,000 Btu/sq ft/hr, and power density will average about 45 kw of heat per liter.

Development and design of this nuclear core has been the severest problem. Major aspects were (1) development of suitable materials for the reactor and (2) development of basic physics design data and relationships to enable calculating the nuclear design.

Vigorous research has been directed toward these key problems. First objective was a fuel material with the requisite corrosion-resistance characteristics and radiation stability. Many potential fuels have been produced, tested, and studied. Fuel has been fabricated into various shapes and tested in piles. Several different core designs were studied for the various fuel elements.

Reactor Designed for Experimentation . . . The entire plant is being so designed that fuel elements of various shapes and materials of various types can be used in cores following after the first core. Such flexibility will add somewhat to PWR costs, but this feature is appropriate to a developmental plant and may help materially to advance atomic power technology.

The reactor vessel will be large enough to accommodate cores physically bigger than the first one. Its shell will be about 9 ft inside diameter and over 25 ft overall height. Shell will consist of carbon steel clad with stainless.

Several high-temperature, high-pressure test loops were designed and installed for fuel tests at the Chalk River and MTR reactors. And preliminary design of the primary coolant system will guide the number, size, and construction of primary loops.

Four-Loop Cooling . . . The main coolant system, which absorbs heat from the reactor and delivers it to the steam generator, will consist of four loops operating off the reactor vessel. Each loop consists of a pump, a steam generator, shut off valves, and interconnecting pipe.

Coolant pumps continuously circulate water between reactor and steam generators. They will be single-stage centrifugal units driven by induction motors of the canned type. Canned motors eliminate the maintenance and leakage problems likely to be encountered if rotating seals were employed. The PWR pumps involve an output of about 1,000 hydraulic hp and an input of about 1,200 kw.

Produces Steam . . . Steam generators will consist of two major components, the heat exchanger and the steam drum. The heat exchanger will have stainless steel tubes welded into heavy tube sheets. The entire assembly will be enclosed in a steel shell. Primary coolant will flow in the tubes.

Steam-plant feed water will enter the shell of the heat exchanger and be converted to steam as it flows upward over the outer surface of the tubes. Steam thus generated will rise to the steam drum where it will be dried by passing through a conventional steam separator. Steam will leave the drum at 600 psia saturated.

Primary coolant stop valves will be of the gate type.

Some will be designed to permit remote operation. They will be hermetically sealed and will function hydraulically. Pipe will be approximately 18 in. OD, fabricated from stainless steel. Pipe and necessary elbows will probably be manufactured by rolling and welding stainless steel plate.

Water will circulate at 2,000 psi to prevent boiling in the core and to eliminate cavitation. Average temperature of this water is maintained at about 525 F.

Auxiliaries . . . In addition to the main coolant system, the primary plant involves a number of auxiliary systems. These accomplish such necessary functions as maintaining the primary system pressure at 2,000 psi, filling and draining the primary system, purifying the water, providing for control of the reactor, dissipating the decay heat of the reactor after shutdown, etc. Preliminary designs of many of these systems have been prepared.

Primary water is maintained at 2,000 psi by a pressurizing tank which floats on the system and is connected to one of the reactor outlet pipes. This tank is normally filled with about equal volumes of water and saturated steam at more than 600 F. This head of steam is maintained by electric heaters in the water. Load changes are accompanied by some volume change of the primary water, which is accommodated by expansion and contraction of the steam head.

Inherent Stability Aids Control . . . Nuclear control will be predicated on the inherent stability of pressurized water reactors. Because of the negative temperature coefficient which can be designed into such a reactor, the core will automatically maintain water temperature at a constant value. If heat is removed from the primary coolant and its temperature decreases, the reactor automatically restores this heat by increasing power output until the water regains the original temperature. The reverse is true when the rate at which heat is being removed from the primary water is decreased. The reactor itself accomplishes this control automatically without operation of any other equipment.

Primary coolant loops are so designed that rated plant output is produced with three loops operating. The fourth loop can be operated if desired but will normally serve as a spare. Loops divide load equally, and the steam generated by each is fed to a steam header and delivered to the turbine.

Pump in each loop circulates water at a rate of about 16,000 gpm to produce 60,000 kw net with 3 loops operating. This makes a total of about 48,000 gpm through the reactor. About 1,000 hydraulic hp is required to circulate the water in each loop. All surfaces of the primary plant which come in contact with high temperature primary coolant water probably will be stainless steel. Components will also be designed to prevent leakage of primary coolant water from the primary system. Shut off valves isolate a loop if it is not required or to clear it for repair while the other three are operating.

Steel Shield . . . The entire primary plant will be enclosed in a steel container to retain any radioactive materials which might escape by accident. Although such accidents are extremely improbable, great precautions must be taken, at least on this first plant.

The reactor which provides the heat and the heat exchangers which generate the steam will be located underground in concrete and steel structures. These underground structures will provide protection to operating personnel and the surrounding area in addition to the many protective devices in the reactor itself.

Confident of Success . . . Those of us vitally concerned with nuclear power feel certain that it has an expanding place in the field of energy generation. But we lack the cost and technical data necessary to show that any one type of reactor is greatly superior to all others. We are still far from knowing how to solve all the problems which face each reactor type. In fact, the successful development of most reactors which now seem promising is sufficiently far in the future that we are not able even to anticipate key technical problems which will arise. The low-enriched pressurized water reactor is today better understood than other types, and hence our problem of economics in building the PWR stands out more clearly. We believe that this type of reactor can be made economical.

Costs Somewhat Uncertain . . . Our experience on PWR has confirmed the difficulties of estimating the cost of a new reactor type without actually designing and building it. Recently we obtained, from the nation's most competent vendors, fixed-price sealed bids on the PWR steam generators and also on a prototype main coolant valve. Both bid invitations were based on complete performance specification. The bids received on each component varied by a factor of almost 5 to 1. With such variation in prices for the more conventional pieces of equipment, as quoted by qualified manufacturers, it seems clear that cost estimates on highly experimental items such as core fabrication and reprocessing are not estimates at all but merely guesses.

Construction of this first plant will point the way to major reductions in both the capital and operating costs of later plants. As the technical requirements become better known, we can prepare firm specifications for all equipment and therefore benefit by competitive bidding across the board. As more experience is gained, we expect to reduce the need for such costly materials as zirconium and stainless steel. We are also confident of finding ways to eliminate the need for certain expensive safety devices.

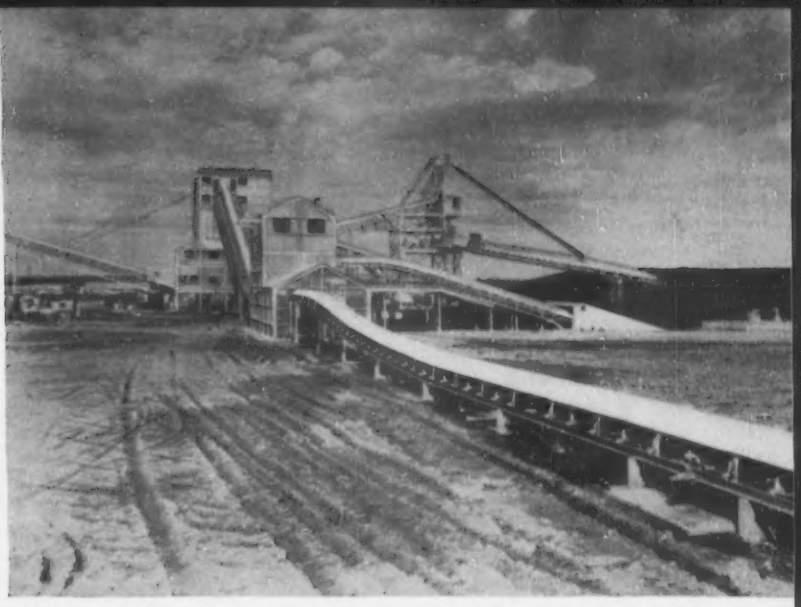
Fuel Processing . . . As we learn more about the physics of slightly enriched water reactors and more about the technology of reactor materials, we know that we can bring about many-fold reductions in the costs of fuel processing. Additional knowledge and experience will extend core life, thus reducing fuel costs by spreading fuel fabrication and reprocessing expenses over many more kilowatt hours. We anticipate finding ways of greatly decreasing the amount of uranium 235 used per kwhr.

More and more of the power will later come from burning plutonium generated in the reactor after operations commence. There is no reason why pressurized water reactors cannot become breeders. But trying to build such a feature into the first plant, along with all the other unprecedented features, would tack years to the completion date.

We do not claim to know, and we do not believe anyone can justly claim to know, which reactor type will ultimately turn out to be most satisfactory. What is considered the best plant will certainly vary with time. Certainly very few techniques in any field have maintained a first position over extended lengths of time.

This account is adapted from remarks before the Atomic Industrial Forum, Washington, D. C., May 24, 1954.

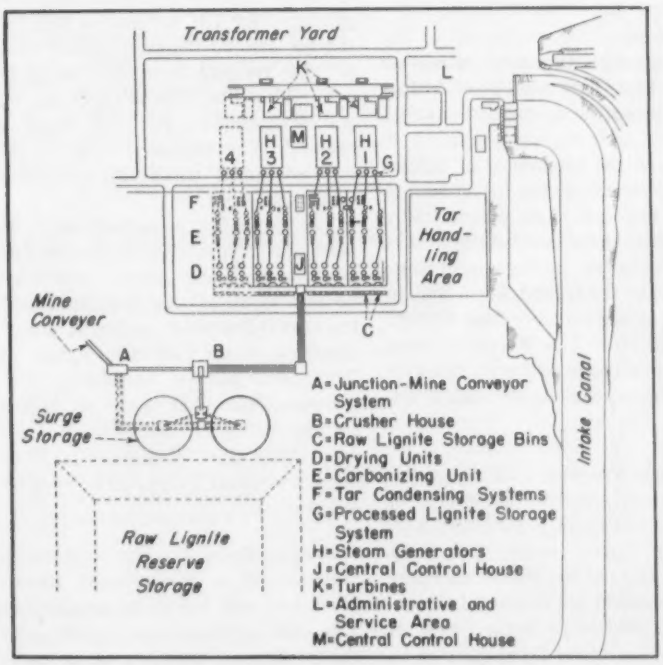
Lignite Fires Alcoa's New Texas Plant



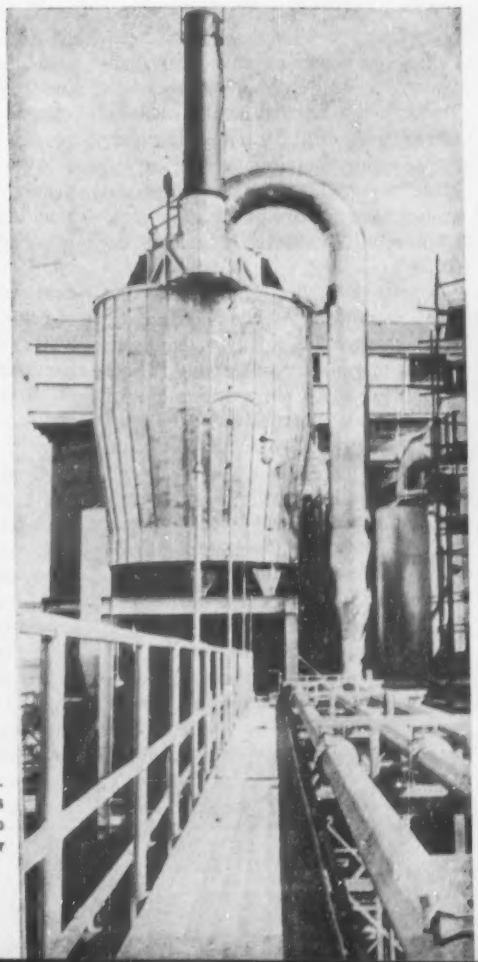
LIGNITE CONVEYING is by rubber-belt, 8-flight system 3½ miles long from deposits through junction house and crushing mill to storage bins behind ground to right. Conveyor rising to left goes to silos, and lignite pile is in the left background

Weight due to high moisture content requires use near deposits and drying before firing. Low-temperature carbonization is expected to yield tars whose sale will help power generation economy. Remaining char will be fired

Story continues on next page ⟶



ARRANGEMENT of fuel handling and lignite processing facilities for Sandow 240,000-kw power plant is shown in the schematic just above. Right is one of the two first lignite drying units put in operation



WET LIGNITE is suspended in a drying column in turbulent state. About 94% of dried dust settles in primary separator. Rest is separated in cyclone separator. Dust from the cyclones returns to furnace. Dust from primary separator moves to silos or carbonizer

Table I—Yields of Primary Products from Low-Temperature Carbonization Assay of Typical Coals at 500° C.

Source	Utah	Wyoming	Texas	N. Dak.
Classification	HVBB	Sub. B	Lignite	Lignite
Btu per lb MAF[1]	14,430	12,640	12,900	12,000
Oxygen, percent MAF	11.4	18.1	17.0	22.0
Analysis, percent				
Moisture	4.6	32.6	35.2	37.0
Volatile matter	44.4	28.7	28.2	27.0
Fixed carbon	46.4	32.9	28.2	30.2
Ash	4.6	5.8	8.4	5.8
	100.0	100.0	100.0	100.0
Btu per lb	13,100	7,790	7,260	6,800
Yields, percent				
Char	65.0	48.0	45.7	45.0
Tar + L. O.	19.6	6.7	7.3	4.0
Gas	5.8	7.4	7.0	8.2
Water	9.6	37.9	40.0	42.8
	100.0	100.0	100.0	100.0
Tar + L. O. gal/ton	44.0	15.4	17.0	9.3
Potential heat distribution, percent				
Char	68.0	77.0	76.0	80.7
Tar + L. O.	23.0	14.6	17.0	10.7
Gas	7.0	6.0	5.0	6.6
	98.0	98.0	98.0	98.0
Char Btu/lb	13,700	12,500	11,430	12,100
Net heat char/coal	0.73	0.82	0.77	0.87

[1] Moisture- and ash-free

Sandow power plant of the Aluminum Co. of America at Rockdale, Texas, is the first specifically designed to use lignite to furnish electric power for smelting aluminum. Two of the plant's three 80,000-kw steam-powered generating units are in use. The third is expected to be ready this month (June).

Lignite in Milam County, where the plant is situated, is characterized by low heating value, relatively high ash, and high moisture content. These properties penalize transportation of lignite, and for this reason Alcoa built close to the deposits. In the Rockdale operation, lignite is strip-mined and conveyed to the plant on a continuous belt 3½ miles long.

The lignite-fueled power plant, together with the aluminum pot lines adjoining it, was erected as part of the so-called "second round" of privately financed expansion for defense requested by the United States government. Heretofore aluminum plants have been supplied by hydroelectric installations or power plants fueled by natural gas. The new plant is Alcoa's solution to a power problem made difficult by the shutting off of private industry from new sources of hydroelectric power and low-cost natural gas.

Although the economics of lignite-generated electric power for aluminum smelting have yet to be commercially established, Alcoa decided there was enough promise in fuel technology developed by the United States Bureau of Mines to make a pioneering venture worth the risk. The Rockdale plant has four potlines in which 90,000 tons of aluminum can be produced annually.

By-Products Program . . . All power requirements are now generated at Rockdale. Generating facilities, supplied with lignite crushed and dried for direct firing in the boilers, are operated for Alcoa by the Industrial Generating Co., affiliate of Texas Power & Light Co. The utility first suggested to Alcoa the use of processed Texas lignite for large-scale generation and was responsible for the design and construction of the power facilities, the contract for which went to Ebasco Services, Inc.

Alcoa hopes eventually to obtain valuable tars from the lignite before it is burned. Pilot operations are being conducted at Rockdale on a low-temperature carbonization process developed by V. F. Parry of the United States Bureau of Mines for obtaining the tars. Chemical by-products will be recovered by distillation, leaving the char for use as fuel. Such a program, by reducing power production costs, would make Rockdale Works competitive with aluminum potlines using hydroelectric and natural gas power sources.

Dried Texas lignite has been carbonized in a Bureau of Mines pilot plant. The tars produced by this method of distillation are primary products containing about 1/3 high-boiling tar acids. Tar recovery amounts to approximately 14 gal per ton from raw Sandow lignite, considering fuel consumed and lost during processing.

Incentives for Carbonizing . . . The major incentive for carbonizing coal is to obtain char for fuel and tar as a by-product. The value of the tar, when credited to the cost of processing, results in a relatively low cost fuel. When utilizing lignite, the improved form value and heat content of the char are other incentives. Lignite might be produced for 10¢ per million Btu, but the tar derived therefrom could have a value ranging from 65¢ to $1.00 per million Btu. The value of the tar can be determined only after extensive research. The increased value of the products must cover the processing costs and profit.

Low-temperature carbonization, in particular, appears attractive because of the smokeless quality and high heating value of the char produced. Its 11,000-Btu-per-lb makes it a substantially better fuel than lignite of 7,000 Btu per lb containing 36% moisture. The char burns at higher efficiency, higher temperature, and with higher heat release per cu ft of furnace volume. It can also be handled at lower cost.

Processing Costs . . . The combustion chamber of a conventional steam-generating unit has to be enlarged to burn the high-moisture lignite efficiently. Drying and carbonizing facilities for producing a high-grade fuel of about 11,000 Btu per lb for combustion in a slagging type furnace may not cost much more than pulverizing and drying equipment for conventional pulverized-fuel firing in a non-slagging

type furnace. Consequently, the net cost of processing may be quite low.

This net cost is the difference in cost between the two methods of utilization in terms of fuel cost at the burner after the value of the tar has been credited. If coal is to be carbonized economically for power plant fuel, the value of the tar must more than pay for the net cost of processing. This requires a low net cost and shorter processing.

Char Characteristics . . . Despite variation in physical and chemical properties of different lower rank coals in their raw state, the pure chars produced therefrom are substantially of the same basic quality. They are characterized by high reactivity and ease of ignition.

The yield of primary products of distillation from different coals varies widely. Table I shows the analysis of and products from Utah high-volatile bituminous B and Wyoming sub-bituminous coals and from Texas and North Dakota lignites. In general, the yield of tar and light oil varies from 9.3 to 44 gal per ton, depending upon the rank of coal.

In the lignites, 76 to 80% of the heat remains in the char which represents about 45% of the weight of the raw coal. In higher rank coals, the char represents about 70% of the heat and about 70% of the yield by weight. Carbonization upgrades the lignites considerably by driving off inert gases and water.

Heat for Carbonization . . . For practical purposes, the heat required for carbonization can be considered equal to the sensible and latent heat in products of carbonization at the temperature they leave the retort. No credit should be taken for any exothermic heat of reaction. Table II illustrates the calculation of heat of carbonization for a Texas lignite and a Utah bituminous coal when carbonized in a fluid bed at 900 F. The calculations are based on product yields in Table I.

The calculations in Table II show that the heat to dry and carbonize lignite is about 65% greater than the heat for carbonizing bitminous coal. This difference is due to the large amount of water that must be expelled. Heat for removing moisture from lignite is more than 75% of the heat for carbonization.

Mining and Conveying . . . Removal of overburden above lignite seams is performed by four enormous dragline excavators. The lignite is loaded by power shovels into a fleet of trucks, each of 62-cu-yd capacity, which transport it to the conveyor belt system. The trucks have specially built aluminum bodies highly resistant to the acid corrosion of lignite.

The conveyor belt system delivering fuel to the plant is designed for a maximum capacity of more than 1,000 tons of lignite per hr. This 3½-mile rubber conveyor belt system is one of the world's longest overland conveyors in operation today. The gallery structure carrying most of the belt and idler system is made of structural aluminum shapes.

The 6-by-0-in. size lignite is deposited in nine storage silos by the conveyor belt system and then carried to hammer-mill crushers which reduce it to usable size (less than ¼-in.) for the drying process. The finely-crushed lignite is stored in nine concrete continuous-pour silos until required. From these silos the raw lignite is conveyed through the drying operations by a pneumatic transport system.

Crushed raw lignite is moved from the storage silos by a pneumatic closed-loop conveyor system and brought to a hopper above a screw feed in the drier. Products of combustion at about 1,500 F, produced by combustion of dried lignite dust with air and recirculated gases, enter the drier section at a pressure of about ¾ psig.

About 94% of the dried dust settles out in the primary separator, and the rest is separated in the secondary cyclone separator. Fine dust from the cyclones is returned to the furnace for combustion. Dried dust from the primary separator is moved with air to the boiler-plant storage silo or to the carbonizer.

When dried lignite is used as fuel, two driers can supply the requirements for each 80,000-kw generating unit. But when char is burned, the dried lignite is moved through the carbonizers pneumatically. Three driers and

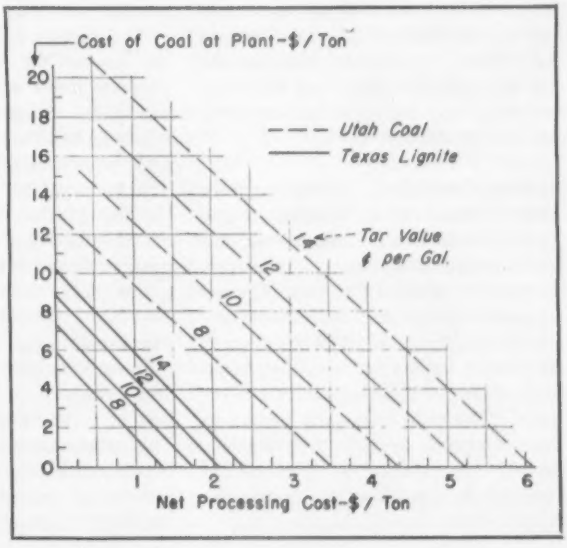
Heat Requirements, Costs of Coal and Lignite Compared

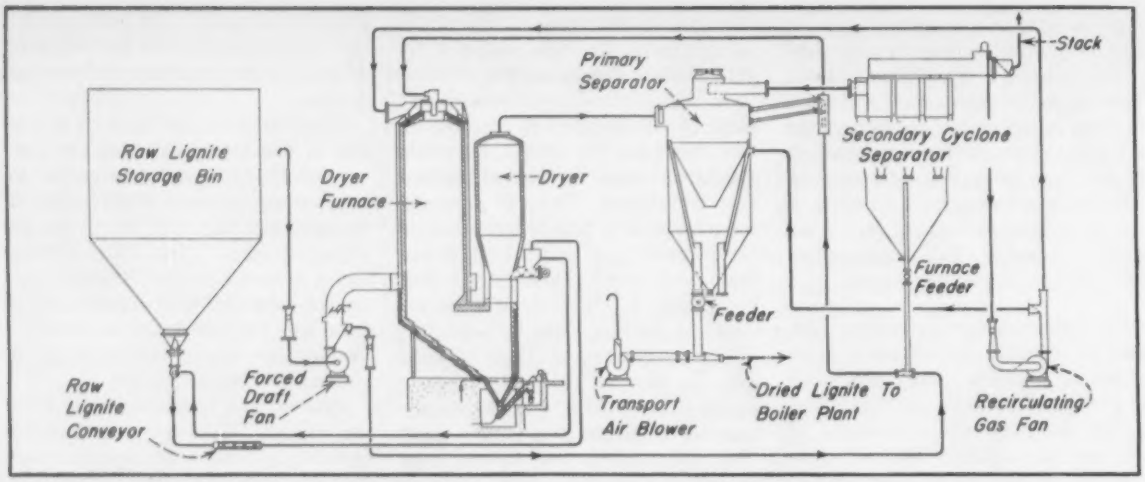
Table II—How Heat of Carbonization Is Calculated

(Based on Product Yields of Table I)

	Btu/lb of Raw Coal
Texas Lignite	
Char = 0.457 (900–60) 0.29	=107
Tar = 0.073 (900–60) 0.75 + 0.073 × 135	= 56
Gas = 0.07 (900–60) 0.39*	= 23
Water = 0.40 (900–60) 0.47 + 0.40 × 1060	=582
Total	768
Utah Bituminous	
Char = 0.55 (900–60) 0.28	=153
Tar = 0.196 (900–60) 0.75 + 0.196 × 135	=149
Gas = 0.058 (900–60) 0.59	= 29
Water = 0.096 (900–60) 0.47 + 0.096 × 1060	=140
Total	471

*The specific heat of gas from lignite is different from that of gas from bituminous coal because of different constituents. Heat of carbonization equals sensible and latent heat in products.





Unit Dries Raw Wet Lignite By Combustion of Lignite Dust

three carbonizers then supply the fuel for each 80,000-kw unit at capacity.

Rockdale Carbonization . . . At Rockdale fine dried lignite is carbonized by blowing it into the base of the externally heated vertical reactor. Heat is transferred from the reactor wall to the suspended mixture, but air reacting with the lignite supplies 60 to 70% of the carbonization heat.

All products of reaction, including char, tar, vapors, and gas leave the top of the reactor, and separation is accomplished in suitable equipment. Gaseous products inside the reactor move upward at a superficial velocity of 6 to 8 fps. Two to 4 cu ft of air are required per lb of dry lignite.

Reactions can be controlled automatically by regulating heat transferred through the wall and by changing the air-coal ratio. This method has certain advantages: the capacity and efficiency are high, and the product gases have increased heating value because of the external heat.

Systems Compared . . . Compared with other systems of carbonization, fine coal is heated in a minimum time, and the capacity of a reactor is relatively very high. About 12 min are required to carbonize the coal, and the capacity of a reactor is 60 to 90 lb per cu ft of reactor volume per hr, depending upon diameter and volume of the reactor. The ratio of heating surface to reactor volume must be properly balanced to permit up to 40% of the required heat to flow in through the reactor wall.

Fine coal particles suspended in the upward gas flow are swept through the reactor rapidly, and the larger particles move through the system at a rate inversely proportional to their size. Carbonization of all sizes is accomplished in minimum time, depending upon the superficial velocity of the gases.

A prototype carbonizer has been in operation at Rockdale for several months. This unit, designed for automatic control, can handle 50 tons of dried lignite per hr. Its reactor is of alloy steel, 6 ft in diameter and 35 ft high, mounted on a special furnace. Process air, compressed to about 8 psig, passes through a recuperator where it is preheated to about 700 F. Part of the preheated air, diverted back to the drier, blows dried lignite to the reactor, and part goes to the reactor.

The mixture of air and lignite enters the base of the reactor, and the fine particles move upward in a turbulent condition. Solids, however, are not in a true fluidized state because of the high superficial velocity of 6 to 8 fps. The temperature of products leaving the top of the reactor is controlled automatically by regulation of combustion around the reactor or by regulation of the air-coal ratio.

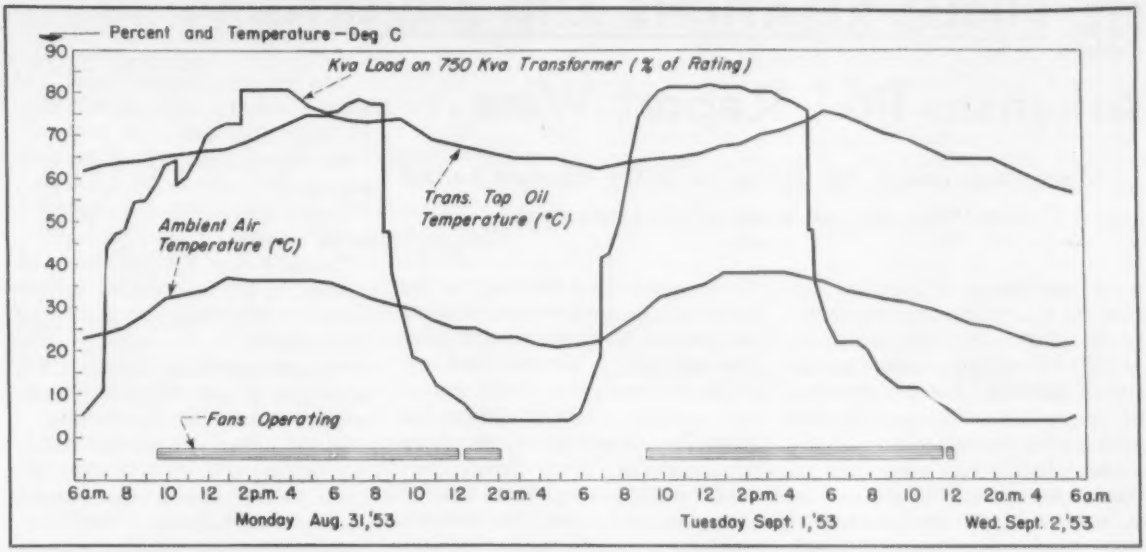
Furnace Heating . . . Combustion air is drawn into the system by a fan which also circulates a portion of the products of combustion from the furnace. This mixture enters the fan at about 600 F and is forced through the combustion air recuperator where it is preheated to about 1,200 F. The mixture of air and products of combustion passes to the furnace ports through a series of flues. Air-gas ratio is controlled to provide about 5% excess air, and the recirculated products of combustion are regulated to secure a theoretical maximum flame temperature of about 2,700 F. The developed temperature around the reactor, however, is controlled to less than 1,900 F to protect the heat-resisting alloy.

Under these conditions of combustion, the rate of heat transfer to the reactor wall is maximum because of the high heat transfer by direct radiation from the gases. Rates exceeding 11,000 Btu per hr per sq ft have been attained in the pilot model at Denver, and it is expected that the rate in the prototype unit will be in the range of 9,000 to 10,000 Btu per hr per sq ft when operating at rated capacity. The volume and heating surface of the reactor have been selected to permit carbonization of lignite at a rate of about 60 lb per hr per cu ft when the superficial velocity is 6 to 8 fps.

Power Plant features . . . The three steam-generating units at Rockdale are each designed to produce 800,000 lb of steam per hr continuously at 1,550 psig, firing either lignite or lignite char. These units are of the continuous slag tap type and are fired tangentially. Each is equipped with 12 fixed burners and has provisions for burning surplus process gas.

Condensate storage tanks are aluminum. Three 10-stage boiler feed pumps are installed for each steam

(*Continued on page* 257)



OPERATING DATA for days when transformer load showed greatest variation, shows effect of fan operation on temperature

With Air Conditioning Load at Peak . . .

Fans Cool Transformers in Vault

Solve Dayton Power's warm-weather network problem after installation of more kva than provided for in original design

NORMAN MEHLHOP, Design Engineer, Dayton Power & Light Co., Dayton, Ohio

Many systems are now troubled by summer vault transformer temperatures, a situation met by Dayton Power & Light Co through the installation of fans. Using controlled forced air ventilation, the utility lowered by approximately 10 C the top oil temperature of network transformers operating in one vault.

Increased network load, because of the growth of air conditioning, compelled the company to install larger transformers in existing vaults. Some of this installed transformer capacity was greater than the natural vault ventilation had been designed to accommodate. During periods of high ambient air temperatures and accompanying maximum loads, excessive transformer temperatures were experienced even when the transformers were not overloaded.

In one four-unit sidewalk type network vault with 750-kva transformers, top oil temperatures last summer hit readings to be expected when the units operated at rated full load. But load checks showed the maximum transformer load was only about 80%.

Grate-covered sidewalk openings for natural ventilation of the vault had been designed for maximum installed capacity per vault unit of 600 kva. This was the approximate maximum load at which the 750-kva transformers were operating.

Select Air Cooling . . . Extensive vault alterations precluded increasing the size of the sidewalk openings. The utility rejected water or spray cooling which would have required pumping water from the vault and because of possible objections to returning water used for cooling to the sewer.

The utility's satisfactory experience with continuously operated forced air cooling in vaults in buildings suggested an adaptation of this expedient. Although only records of maximum transformer temperatures had been kept for such vaults, the company felt that continuous ventilation at the troublesome location would not be necessary. Fans could be controlled and operated by a thermal element responding to transformer temperature.

Low-Cost Control . . . It was desirable to retain the maximum reading thermometer. As the transformers were not equipped with an extra thermometer well, the fan controls had to be mounted outside the transformer case in a position where they could operate as a function of top oil temperature.

The control decided upon was a relatively inexpensive fan control such as is used on warm air furnaces. This unit, equipped with a mercury switch to eliminate contact difficulties, had an adjustable range from 70 to 310 F with a maximum differential of 10 F.

This control was mounted between and near the top of the transformer radiator coils, the thermal element in close proximity to the transformer case and out of the air streams of the fans. The mercury switch's electrical rating was sufficient for direct control of one fan motor. The control started and stopped the three fans required by the physical layout of the vault.

Ball-Bearing Motors . . . Fans were of the portable type, driven by ¼-hp motors and each capable of moving

(*Continued on page* 258)

Arkansas P&L Report Wins

Takes first among 106 entries in Reddy Kilowatt Annual Report Contest. Presentation made at EEI convention

Arkansas Power & Light Co captured the Reddy Kilowatt Annual Report Contest for its 1953 annual report. The award was presented by Ash Collins, president of Reddy Kilowatt, Inc, at the Edison Electric Institute convention at Atlantic City.

The Arkansas P&L report was selected as the best of 106 entries, a record number, by the three judges: Fischer S. Black, editor, Electrical World; Merryle Rukeyser, financial writer; and Harold H. Young, partner, Eastman, Dillon & Co.

Judges Comment . . . The report was beautifully balanced, with splendid pictures. Its big spread on area development and complete statistical tables were well presented.

The report put unusually good emphasis on the responsibilities of the company to the security holders, the employees, the customers, and the prosperity of the area. This idea was carried throughout with the theme covering the company's stewardship for stockholders, customers, employees, and all the people. This attracted favorable attention.

Other good points included the showing of end results of service to the consumers, the orderly arrangement of the report, and the comprehensive summary for the benefit of even the casual reader.

Pennsylvania Power & Light Co took honorable mention in Class A (400,000 or more customers).

Judges Comment . . . The spread showed the importance of the people in the various jobs in the company. This was summarized somewhat by one of the headings in the report reading, "Many Minds, Many Hands, and Teamwork Are Vital to Successful Business Operation."

Altogether the report was well balanced, had simplified financial statements, and made excellent use of color and charts.

Special mention in this class went to Wisconsin Electric Power Co and to the American Gas & Electric Co. The former was honored because its report had splendid illustrations covering the front and back. It was also mentioned for its able description of sales promotion, a subject which the judges felt should be stressed more and more through annual reports. The excellent centerspread showing the company's service area and growth of system demand and generating capacity was also applauded.

The AG&E report was cited for its extremely clear and factual description of the company's operations, sales promotion activities, and contributions to atomic power development; and especially for its look into the future.

New York State Electric & Gas Corp took honorable mention in Class B (200,000 to 400,000 customers).

Judges Comment . . . This was a very fine, well-balanced report which gets the reader into the story right in the beginning. The summary of the disposition of the revenue dollar was outstanding. The report dramatized the year's operations effectively with charts and pictures. It was also mentioned for its description of the area and the diversification of customers.

In addition the report contained a note to the effect that a complete, separate statistical supplement was available to any stockholder upon request. This made it unnecessary for the small stockholder to bother with great detailed statistics unless particularly interested.

Kansas City Power & Light Co got special mention for the excellent pictorial treatment of the front and back covers of its report.

Kansas Power & Light Co took honorable mention in Class C (100,000 to 200,000 customers).

Judges Comment . . . This report was cited for several outstanding features:

The particularly attractive cover integrated with the back cover of the report, thus making both covers do a job.

The attractive physical layout and good charts, the artwork well done and in excellent taste.

Its quick summary of significant information.

Special mention in this class went to the reports of these companies:

Central Power & Light Co for an outstanding job in describing in concise terms 1953 operations in text and charts and for an interesting analysis of the characteristics of present and future load growth with special attention to year-round air conditioning.

Pacific Power & Light Co for its very unusual map of the system and territory and for well selected pictures showing industrial uses of electricity.

Wisconsin Power & Light Co for its excellent summary of the construction program on page 8 of the report.

Atlantic City Electric Co for its appealing pictorial tribute to Thomas A. Edison and the Edison Credo, and for its excellent example of the use of the back cover of the report. It was also mentioned for its good creed for private enterprise in the power field.

Pennsylvania Power Co took honorable mention in Class D (Up to 100,000 customers).

Judges Comment . . . This was a well-balanced report in terms of the basic elements and its good description of the territory served, the customers and sales activities. In addition to giving simplified data for the lay stockholder's mind, it also presented good material information for the ten-year period for the benefit of the analyst.

This report recognized more and more the importance of the customer and gave recognition to this new trend in featuring customer benefits rather than the technical means by which they are achieved. This was evidenced by the appealing cover photograph.

The judges were not only complimentary of the outstanding improvements in most of the reports but were impressed with the growing trend to feature human interest or customer benefit values of corporate and plant developments. Instead of overemphasizing complicated pictures of power lines and generators and technical pictures, the judges recommended that these features could well be related to the end results in terms of benefits to the customer from the use of the electricity produced.

WASHINGTON COMMENT

JESSE MOCK

A number of the men who interpreted and administered New Deal power policies may be out of the government, but they haven't given up efforts to influence policy of the present Administration.

Old New Dealers Neither Die Nor Fade Away

Recent appearances of former Reclamation Commissioner Michael Straus and former Federal Power Commission Chairman Leland Olds at the Hells Canyon hearing is a case in point. Both of these men played key roles in molding power policies and procedures under former Democratic regimes.

As head of the Reclamation Bureau Straus sparked the gigantic power-reclamation construction program of the bureau in the postwar years. Under him plans were mapped out for such projects as the $360 million Hells Canyon project on the Snake River in Idaho. He led at least one unsuccessful attempt to gain Congressional authorization of the Snake River project.

Straus, by the same token, opposed private development of the Snake River site and presumably played a key role in persuading Interior Department to fight the Idaho Power Co plan before the FPC.

Olds Contributed . . . While Olds had much less direct connections with the proposed federal project at Hells Canyon, his public power bias contributed to New Deal power policies. When the Senate failed to confirm him for another term as chairman of FPC, former Interior Secretary Oscar Chapman found a government position for him as a member of a study group investigating New England power resources.

At the recent hearings both these men were brought in to argue on behalf of a federal dam at Hells Canyon—a project they had been unsuccessful in gaining under a Democratic Administration and under a Democratic Congress.

As far as Electrical World was able to determine this was Straus' first appearance before a government body since he stepped out as Reclamation Commissioner last year. He has written an occasional public power article for newspapers.

Olds is now with the Public Affairs Institute, a research organization with a strong bias toward public power. He, too, writes an occasional article on public power for publication.

Testifies at Monopoly Hearings . . . One of the more active of the former New Dealers in the power field is William C. Wise, former deputy administrator of rural Electrification Administration. He has been retained by several REA-financed co-op groups to present their case in Washington. He has been on hand and occasionally played a dominant role in the power hearings before the Senate Monopoly Subcommittee which is headed by North Dakota Republican William Langer. This group has been a sounding board for critics of Republican power policy.

Henry Blalock, former Southwestern Power Administration representative in Washington, recently made an appearance as an advisor to some of the southwestern co-op groups at a Langer committee hearing. He was severed from government service earlier this year under the SPA reorganization.

Former Agriculture Secretary Charles F. Brannan and former Presidential Economic Advisor Leon D. Keyserling have been associated with the National Farmers Union since the Truman Administration stepped out last year. While their influence on power matters both then and now has been indirect, its a safe bet that they still plug hard for a return of New Deal power policies.

National Farmers Union, you will remember, sponsored the Electric Consumers Conference in Denver last December (EW, Dec. 21, '53, p 8), and has been vigorously opposing Republican power policy.

Former President Truman himself is still hitting on occasional lick for the power policies of his Administration. He addressed a recent closed session of the Electric Consumers Conference workshop in Washington in an effort to boost opposition to GOP policies.

Of course these men have every right to plug for the policies they think have the most political appeal. This recitation is merely for the purpose of indicating the source of some of the loud opposition to present power policies.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Wave form at frequencies well above 60 cps are nearer the sinusoidal than the commercial 60 cps waves. Absence of harmonics means avoidance of radio interference therefore if fluorescent lamps should be operated at 3,000 cps.

Carrier frequencies of 30-50 kc are good for telemetering and long-line relaying, 50-125 kc for telephone channels, and 155-200 kc for short haul relaying, duplexed telephony, and telemetering.

Loss of fuel to the boiler should trip the turbine to prevent drop in steam pressure, rise in boiler water level, and possible water-carry-over damage to the turbine.

Gas and oil as fuels require fewer interlocks and controls than pulverized coal with its associated pulverizing mills, feeders, blowers, etc.

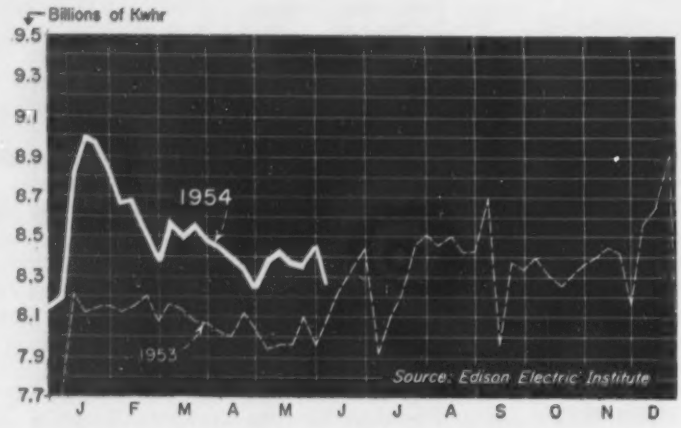
Forced-oil transformers will almost surely show different temperatures for different phases, even on balanced load, if some of the pumps should work backwards.

Natural gas gives lower boiler efficiencies than oil or coal because of the higher loss of heat evaporation of the water generated in the combustion of its higher content of hydrogen.

Power transfer ability of a line with 50% inductive compensation is approximately equal to the power transfer ability of two parallel lines of the same length and voltage but uncompensated.

Inspection doors on pressure-fired boilers should not be capable of opening until (compressed) aspirating air has been turned on to prevent gas blowing out from the furnace.

STATISTICS



Output Week Ended June 5—8,246,000,000 Kwhr

Seasonally Adjusted Index†—170.0*

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
June 5	+1.9	−3.5	−4.4	−7.9	+2.9	+16.7	+1.7	+6.8	+4.5	+7.5
May 29	+6.0	+5.4	+1.6	+0.5	+7.9	+15.7	−4.8	+13.1	+8.7	+12.7
May 22	+4.5	+3.5	−0.9	−4.2	+8.1	+16.4	+7.9	+6.2	+5.4	+8.3

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load‡ (Million Kw)	Mar.	74.7	74.9	70.7
Capacity (Million Kw)	Apr.	93.56	92.99	83.84
Production (Billion Kwhr)	Apr.	36.84	38.92	35.63
Hydro	Apr.	9.91	9.92	9.70
Fuel	Apr.	26.93	29.00	25.92
Fuel Consumption				
Coal (Million Tons)	Apr.	8.68	9.89	8.91
Oil (Million Barrels)	Apr.	4.78	6.46	7.15
Gas (Billion Cu Ft)	Apr.	91.10	78.23	76.58
Sales (Billion Kwhr)	Mar.	32.53	32.37	31.73
Residential	Mar.	10.15	10.50	9.10
Commercial	Mar.	5.60	5.60	5.18
Industrial	Mar.	14.67	14.21	15.36
Other	Mar.	2.10	2.05	2.09
Net Income Class A & B Companies ($ Million)	Mar.	94.29	111.85	91.64
Estimated Dec. '54 Peak‡ (Million Kw)	Mar.	88.5	88.8	92.1
Kwhr per Residential Customer (12 Month Average)	Mar.	2,398	2,382	2,211
Revenue per Kwhr Residential Service (12 Month Average)	Mar.	2.72¢	2.73¢	2.76¢
Canadian Production (Billion Kwhr)	Mar.	5.77	5.15	5.78

Business Statistics

FRB Industrial Production Index†	Apr.	123	125	136
Gross National Production Annual Rate ($ Billion)	1st Qtr.	357.8	363.5	363.9
EW 4 Industry Production Index†	Apr.	115.1	116.7	126.5
ENR Construction Cost Index††	May	129.7	129.0	123.5
BLS Consumer's Price Index	Apr.	114.6	114.8	113.7
NEMA Insulation Materials Sales Index†	Mar.	136	120	190
NEMA Electric Appliance Sales Index†	Mar.	105	98	140
NEMA Household Refrig. Sales Index†	Mar.	89	91	108
Metal Prices (June 8)				
Copper, Conn., V., lb		$.30	.29¾	.29¾
Lead, N. Y., lb		.14¼	.14	.13¼
Zinc, prime Western E. St. Louis, lb		.11	.10¼	.11
Tin, Straits, qual. N. Y. lb		.93¾	.93½	.92¾
Aluminum, ingot, base price		.21½	.21½	.20½
Nickel, base price		.60	.60	.60
Steel, billets, Pitts., ton		62.00	62.00	59.00
Steel, scrap, No. 1 heavy, Pitts., ton		30.00	28.00	39.00

*Preliminary **Revised ‡Class I Systems †1947-49=100 ††1949=100

Shifts in GNP—Security Outlay Down; Civilian Up

In the first quarter of this year, gross national product dropped about $6 billion below the final quarter of last year, declining to a total of $357.8 billion. That drop about matched the decline from the third to the fourth quarter last year, although at an annual rate, the total figure is still $10 billion higher than the 1952 total.

The quarter was marked by a continued reduction in inventories, with a moderate increase in the rate at which this was taking place from $3 billion in the fourth quarter to $5 billion in the first. Production remained below purchases for final use.

The largest decrease in final purchases were in Federal national security outlays, down $3 billion from the final quarter of last year. In contrast, total civilian final purchases remained near the $316½ billion fourth-quarter high, and were $4 billion higher than the second quarter 1953 rate.

The bulk of this rise occurred in government civilian purchases, with State and local government outlays accounting for the major portion of the total. Additional federal spending in supporting farm prices also was an important factor, checking the decline in the farm sector of the economy. Other civilian purchases remained firm as advances in construction and net purchases from abroad served to curb the decline in producers' durable equipment.

Personal consumption expenditures were at an annual rate of $230 billion during the first quarter. Although there has been little variation in that figure over the last four quarters, its composition has altered remarkably. Outlays for services rose from 33½% of the total in the first quarter of 1953 to 35½% in this year's first quarter. In dollar terms, the figure for the first quarter totalled $81½ billion, up $1 billion over the final period of last year, though at a smaller rate of increase than in the preceding quarters.

This increase is largely due to the rate of growth of new nonfarm dwellings—over a milion units a year. And with the expansion in housing expenditures, there is the parallel growth in a variety of home services, including electricity, gas, water, and telephone.

FINANCIAL

Pact Defines Pole Ownership

Contract outlining joint use of poles is consummated between Colorado Central Power and Mountain States T&T

A more equitable division of ownership and a liberal definition of normal pole spaces mark a recent contract covering joint-use poles between Colorado Central Power Co, Englewood, and Mountain States Telephone & Telegraph Co, Denver. Termination date of the new contract is Jan. 2, 1957, unless either party acts to cancel the agreement sooner.

Contract calls for the equitable division of ownership of joint-use poles to be 55% for the power utility and 45% for the telephone company. Both parties shall endeavor to establish and maintain this division of jointly used poles. As compensation for any deviation from this ratio, the contract stipulates that the utility owning less than the number of poles required shall make a payment in lieu of rental.

Colorado Central will pay to Mountain States $6.30 for each jointly used pole owned by the telephone company. It in turn must pay $5.20 for each jointly used pole owned by Colorado Central. The smaller total sum shall be deducted from the larger and Colorado Central or Mountain States as the case may be, shall pay to the other the difference. Such compensation shall be paid annually to the other before Jan. 5.

'Division' Explained . . . In elaborating on the 55-45% division, the contract states "an equitable division of ownership is accomplished when the savings for each party accruing through the joint use of poles are in proportion to the amount of pole investment each party would have had if separate pole lines had been constructed. An equitable division is reached when it is such that neither party shall have to pay to the other any payments because of their respective use of joint poles owned by the other."

How far each utility deviates from the 55-45% ratio will be determined annually about the middle of November when a cooperative count of poles in joint use will be made. Also tabulated will be the number of poles from which either party removed all of its attachments during the preceding 12 months.

Normal pole space is defined in the contract as that "linear portion of a joint pole parallel to its axis reserved for the exclusive use of each party respectively, except that vertical attachments of one party may be located in the space reserved for the other party in accordance with specifications" mentioned in the contract.

Pole Space Defined . . . Specifically, the contract states that the normal pole space for Colorado Central is that necessary to mount primary and secondary conductors and required primary buckarms or transformers or similar distribution equipment. This space shall be at such a height above Mountain States' normal space as to provide the pole attachment and mid-span conductor clearances as suggested in Edison Electric Institute publication M-12, October, 1945, and Field Trial Part 5 of joint pole practices, May, 1946.

Normal pole space for the telephone company is that amount as suggested in the above references to accommodate telephone lines and equipment at a sufficient height above ground and below the power utility's normal space.

Owner Bears Pole Expense . . . All poles to be erected under the agreement will be built at the expense of the owner. Furthermore, the agreement states that all poles 50 ft or higher will be installed and owned by Colorado Central. As to abandonment of poles, the stipulation is that poles abandoned by the owner, but still bearing attachments only of the other party after due notice has been given by the owner, shall then become the property of the other utility company. And the contract calls for payment to be made to the former owner of the abandoned pole according to a payment schedule that varies from $22 for a new 20-ft pole to $103.50 for new poles 50 ft and over. Remaining life factors ranging from 1.0, representing 0-3 years in place, to 0.0 for over 27 years in place, are applied to place a more realistic value on the pole.

Puget Sound P&L Buys Two Small Utilities

After having had its properties whittled away little by little by public power groups in recent years, the Puget Sound Power & Light Co has reversed the trend and purchased two small utilities on islands near Anacortes, Wash.

Properties involved are those of the Saratoga Light & Water Co on Whidbey Island, serving 140 customers, and the Guemes Island Cooperative Association, with 114 customers. The Saratoga company has been operated by C. Clinton Freestone since 1946, first with a diesel plant and later with power purchased from Puget Power. The Guemes Island system, dating back to 1949, obtained its power from Puget by a submarine cable from Anacortes.

Puget's Northern Division Manager J. F. Wallin, in announcing these purchases, said "Their new electric rates will now be substantially lower."

SEC Asks For Comments On Security Holder Rights

The Securities and Exchange Commission is getting ready to adopt a set of standards setting out the rights of preferred stock and bondholders of public utility holding companies.

SEC is circulating its "Statements of Policy" for comment by June 30 before final policy is adopted. The proposed standards would be included in the company charter amendments dealing with financing.

SEC has insisted on certain standards in utility financing in regard to preferred stock and bondholders, but only by approval in specific orders or in a case decision. The attempt now is being made to put these "folklore rights" down in writing on formal documents.

In the case of bonds, SEC's pro-

posed standards deal with a holder's rights in certain situations, such as the decision by the company to issue additional bonds and to aquire property subject to a prior lien, to requirements for sinking and improvement funds, a renewal and replacement fund, and on limitations on paying common stock dividends.

Proposed standards regarding preferred stockholders' rights include what rights such holders have to elect new directors after default in dividend payments; rights of the company to create unsecured debt, to merge or consolidate; required limitations on common stock dividends; and what provisions must be made on behalf of preferred stockholders in case of changes in preferred stock charter amendments, issuance of new preferred, and payment to preferred holders in case of voluntary liquidation.

Customer Bills . . .

. . . can be delivered two days after meter reading, WWP official tells Nelpa session

Tight scheduling can deliver bills to customers in a fraction over two days after the meter is read. But this calls for a billing office routine "that doesn't allow for bad weather or illness," said Allan F. Elder, assistant treasurer, Washington Water Power Co, Spokane. He spoke before the 29th annual conference of the Accounting and Business Practice section of the Northwest Electric Light & Power Association, Spokane, May 20-22. Billing, collections, and troublesome dogs also were discussed by the 90 conference members.

Reading schedules are altered to fit the billing schedule, explained Elder, so that normally there is a steady in-flow of books. When a meter book arrives, the billing is completed that same day in about ten hours. Reading schedules take into account timetables and layovers of buses and trains. This system, Elder concluded, uses less people than would a looser schedule because no extra workers are needed to store and process books. "And 95% of the time, we hit the schedule on the nose," he told the conference members.

(*Continued on page* 260)

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1954									
June 3	**2.90**	**2.97**	**3.18**	**4.07**	**4.17**	**4.47**	**4.70**	**5.07**	**5.55**
May 27	2.89	2.96	3.17	4.07	4.17	4.46	4.72	5.10	5.50
END OF QTR									
1st 1954	2.82	2.87	3.14	3.88	4.09	4.42	4.83	5.19	5.42
4th 1953	3.07	3.12	3.34	4.17	4.32	4.62	5.07	5.57	5.51
3rd 1953	3.30	3.33	3.54	4.35	4.52	4.83	5.36	5.97	6.01
2nd 1953	3.34	3.46	3.64	4.47	4.70	4.88	5.52	5.93	6.10

Data: Reis & Chandler, Inc.

EARNINGS

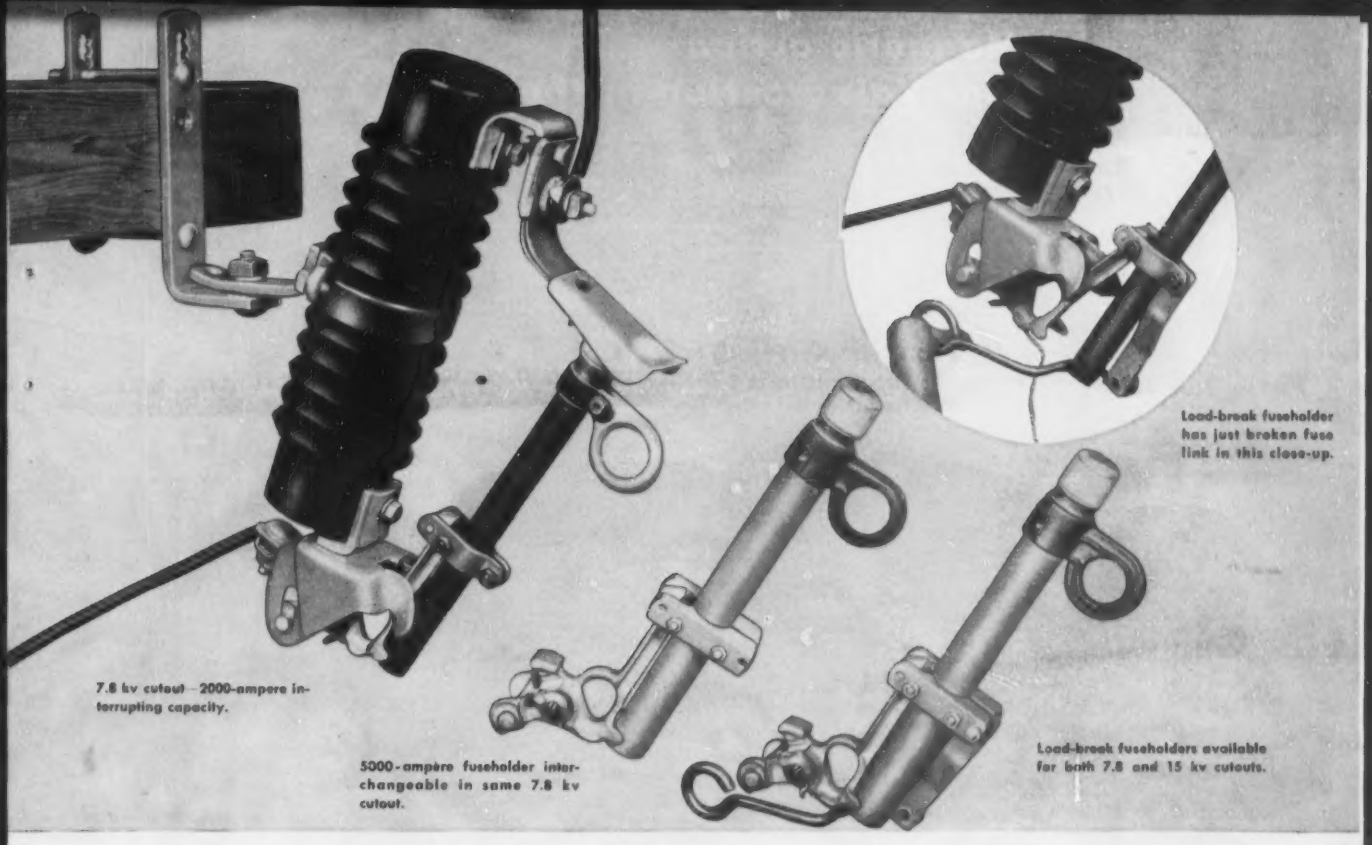
Company	Period Months	Ended	Net Income 1954	Net Income 1953	Earnings Per Common Share 1954	Earnings Per Common Share 1953
Dayton Power & Light	12	Mar.	$8,389,794	$7,752,625	$2.88(a)	$2.64(a)
Puget Sound Power & Light	12	Mar.	4,099,385	3,282,047	1.88	1.51
			1953	**1952**	**1953**	**1952**
Arkansas-Missouri Power	12	Dec.	$802,275	$820,991	$1.55(b)	$1.89(b)
Sacramento Municipal Utility District	12	Dec.(c)	2,686,654	2,440,189	....	....

Notes—Figures shown for the last two companies have been audited; (a) Based on 2,585,728 shares in 1954 and 2,573,697 shares in 1953; (b) Based on 426,715 shares in 1953 and 379,302 shares in 1952; and (c) Net revenue.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF JUNE 3-9			
Bonds			
Southwestern Gas & Electric—1st mtg 3¼% due 1984	$10,000	101.537%	3.17%
Salt River Project Agricultural & Improvement District, Ariz.—bonds due 1960-82	3,500	various	2.60-3.50
Preferred Stock			
Central Maine Power—50,423 sh 4.60% $100 par convertible (being offered commonholders on the basis of 1-for-50 and the 6% preferred stockholders on a 1-for-10 basis, record June 3 to expire June 14)	$5,042	$100.00	4.60%
Common Stock			
Hilo Electric Light—25,000 sh (being offered commonholders on 1-for-4 basis, record June 5)	$500	$20.00	8.00%
Philadelphia Electric—906,917 sh (being offered commonholders on 1-for-12 basis, record June 7 to expire June 28)	30,835	34.00	5.20
SCHEDULE FOR JUNE—JULY			
Bonds			**Bid Date**
Jersey Central Power & Light—1st mtg due 1984	$6,000	.....	June 15
Central Illinois Public Service—1st mtg due 1984	5,000	.....	June 15
Central Vermont Public Service—1st mtg due 1984	4,000	.....	June 21
Gulf Power—1st mtg due 1984	10,000	.....	June 22
Duquesne Light—1st mtg due 1984	16,000	.....	June 29
Boston Edison—1st mtg due 1984	18,000	.....	.....
Gulf States Utilities—1st mtg due 1984	24,000	.....	.....(e)
Consolidated Edison Co of N. Y.—1st mtg due 1984	50,000	.....	.....(e)
Consumers Power—1st mtg due 1984	25,000	.....	.....(e)
Preferred Stock			
Southern Nevada Power—250,000 sh (company will sell 50,000 sh and balance of 200,000 will be acquired by the underwriters from certain selling stockholders)	$.....	.....	June 8(c)
Connecticut Light & Power—200,000 sh $50 par	10,000	.....	June 17
Duquesne Light—120,000 sh $50 par	6,000	.....	June 23
Pacific Gas & Electric—1,000,000 sh $25 par cum	25,000	.....	June 23
Maine Public Service—40,000 sh $50 par cum	2,000	.....	June 24(h)
Florida Power & Light—50,000 sh $100 par	5,000	.....	June 30
Public Service Co of New Hampshire—about 75,000 sh	7,500	.....	.....
California Electric Power—105,000 sh $50 par	5,250	.....	.....(b)
Missouri Public Service—50,000 sh $100 par	5,000	.....	.....(a)
Southern Utah Power—3,224 sh 5% $100 par (1,224 sh to be exchanged for a like amount of 4½% now outstanding and balance of 2,000 sh to be sold privately)	322	.....	.....
Central Vermont Public Service—10,000 sh $100 par 4.65%	1,000	.....	.....(g)
Gulf States Utilities—160,000 sh $100 par	16,000	.....	.....(e)
Common Stock			
Long Island Lighting—690,062 sh (to be offered commonholders on 1-for-8 basis, record about June 16; unsubscribed sh to be sold to underwriters; 64,685 sh to be offered to employees)	.....	.....	.....
Southern Utah Power—13,135 sh (to be offered commonholders on a 1-for-6 basis about June 11)	.....	.....	.....
Florida Power & Light—245,000 sh	.....	.....	June 30
UNSCHEDULED, AND/OR UNDER CONSIDERATION			
Bonds			
Arkansas Power & Light—1st mtg due 1984	$7,500	.....	.....

Notes—(a) Postponed indefinitely; Kidder, Peabody & Co, underwriters; (b) Temporarily postponed Merrill Lynch, Pierce, Fenner & Beane group, underwriters; (c) William R. Staats & Co group, underwriters; (e) Temporarily postponed; (f) Putnam & Co group, underwriters; (g) To be sold privately; and (h) Merrill, Lynch, Pierce, Fenner & Beane, and Kidder Peabody & Co, underwriters.



7.8 kv cutout—2000-ampere interrupting capacity.

5000-ampere fuseholder interchangeable in same 7.8 kv cutout.

Load-break fuseholders available for both 7.8 and 15 kv cutouts.

Load-break fuseholder has just broken fuse link in this close-up.

NEW G-E OPEN DROPOUT CUTOUT

For FAULT PROTECTION—standard or heavy duty and LOAD BREAK—up to full load at any power-factor.

New simplified design of General Electric 7.8 kv and 15 kv, 100-ampere cutouts have these extra features:

Birdproof Construction accomplished by unique method of clamping the mounting support to the opposite side of insulator from live parts.

Liberal electrical and mechanical strength. New hollow tube wet process porcelain has under-cut petticoats for generous creep and strike distance; and porcelain insert fired within tube provides inside solid barrier between top and bottom live parts. Screen prevents insect nest within porcelain. Clamping U-bolt around porcelain is insulated with molded polyvinyl chloride having excellent insulating and weathering characteristics.

Compression bolting to porcelain—top and bottom fittings are bolted to insulator with porcelain under compression—for maximum mechanical strength. Compression clamps inside the porcelain maintain tight assembly.

Shielded top contact and latch—by roof-shaped contour and having ball-point contact surface to top of fuseholder, the top contact and its latch are protected from dirt deposits and sleet.

Other distinctive features are retained: Hinge guides allow slamming fuseholder from any angle; threaded cap seal at upper end of fuseholder forces expulsion gases downward; silver-plated contacts shielded from corrosive agents; vertical or angle-tilted swivel mounting with EEI-NEMA bracket; latch provides time-delay opening—assures fault current interruption before dropout action occurs; fuseholder tube of fiber and fabric-base Textolite* is water resistant, will not warp or split; close coupling of fuseholder to porcelain prevents multiplication of recoil forces.

For more information on these new open cutouts, contact your nearest G-E Sales Representative, or write to General Electric Company, Section 433-4, Schenectady 5, New York.

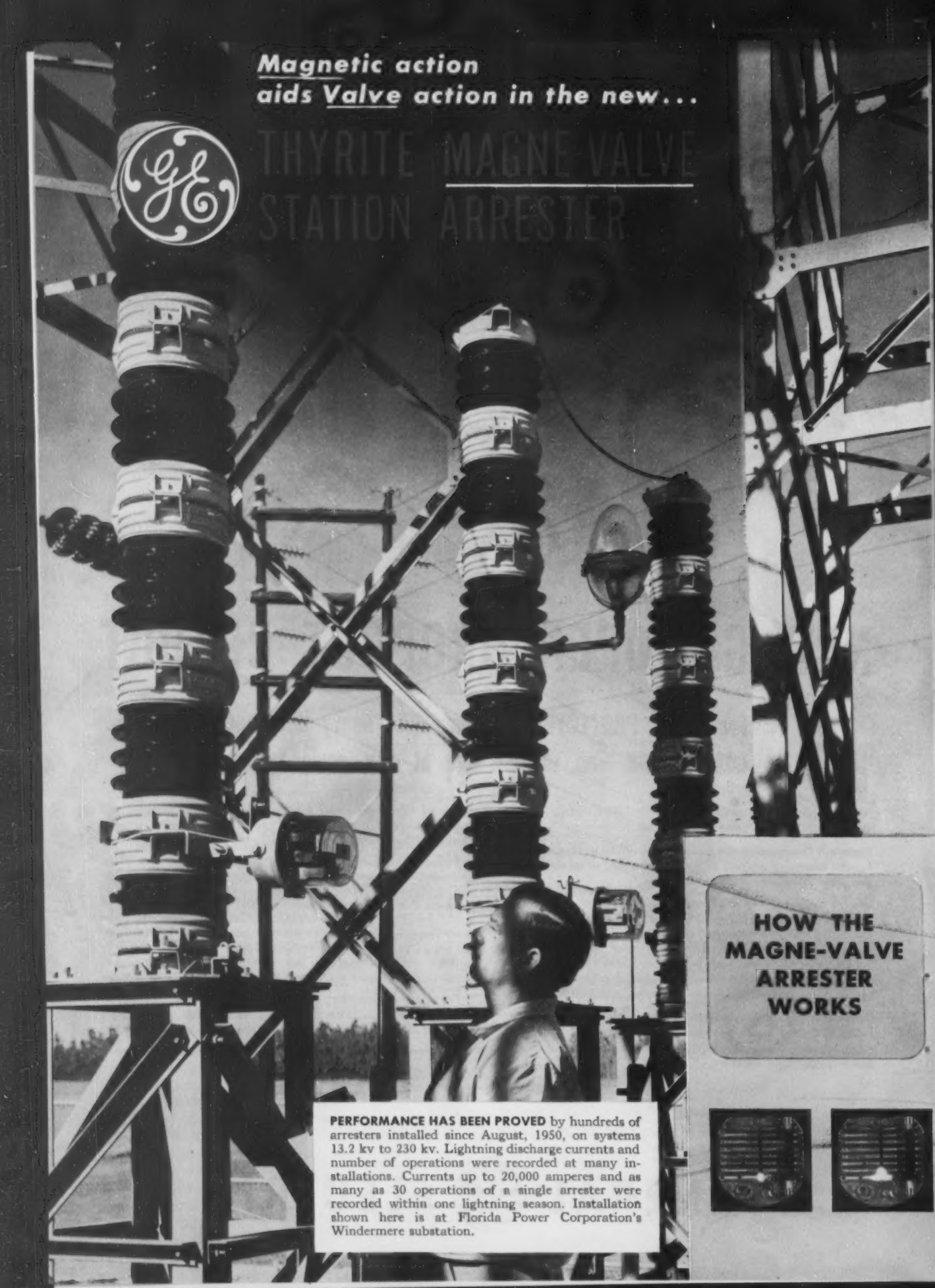
*Reg. trade-mark of General Electric Company

Progress is our most important product

GENERAL ELECTRIC

Magnetic action
aids Valve action in the new...

THYRITE MAGNE-VALVE STATION ARRESTER



PERFORMANCE HAS BEEN PROVED by hundreds of arresters installed since August, 1950, on systems 13.2 kv to 230 kv. Lightning discharge currents and number of operations were recorded at many installations. Currents up to 20,000 amperes and as many as 30 operations of a single arrester were recorded within one lightning season. Installation shown here is at Florida Power Corporation's Windermere substation.

HOW THE MAGNE-VALVE ARRESTER WORKS

20% better protective level
3 times greater endurance

The new Thyrite* Magne-valve arrester is a major advance in reliability of co-ordinated protection of station apparatus. Let's appraise it!

FOR APPARATUS HAVING STANDARD BIL'S—

You get an unprecedented margin of protection that assures co-ordinated protection for many times higher stroke currents—even 100,000 amperes. This super-protection is especially valuable where lines or substations are not shielded or where practicable shielding may not be infallible.

You get an extra margin of protection which tends to offset adverse effects of separation between arrester and apparatus—enabling co-ordinated protection to apparatus at greater distances from the arrester.

FOR H-V APPARATUS HAVING REDUCED INSULATION—

You get as large a margin of safety in protecting 1-step reduced BIL insulation as was heretofore possible only when protecting full insulation (standard BIL). Hence, the new arrester enables a more positive approach toward reduced insulation and resulting tremendous savings in apparatus investments.

FOR DRY-TYPE TRANSFORMERS—

You get a good margin of protection—heretofore limited. Although oil- or askarel-filled transformers are distinctly preferable for connection to lines exposed to lightning, the decidedly lower impulse strength of dry-type transformers can now be better protected.

FOR APPARATUS HAVING DEPRECIATED INSULATION—

You get more positive protection—to preserve and greatly extend the operating life of old but important apparatus.

**Reg. Trademark of General Electric Co.*

FOR AC ROTATING MACHINES—

You get as good margin of protection to even impedance-grounded neutral rotating machines using ungrounded-neutral 100% rating arresters, as was heretofore practicable with only grounded-neutral 80% rating arrester. And for grounded-neutral machines, you can now limit the lightning stresses to 80% of the machine's 1-minute hi-pot test level. Both are important achievements for better protection of generators, synchronous condensers, and motors, alike.

FOR ALL THESE APPLICATIONS—

You get full-fledged uncompromised ***station*** arrester protection—6-inch diameter low-resistance Thyrite valve-disk with exclusive integrally fired ceramic insulating collar, the most efficient valve element ever offered.

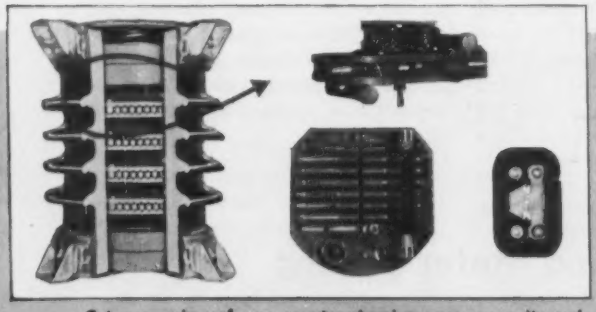
You get straight-in-line, low-resistance discharge path—28 sq. inches of cross-sectional area, with no tortuous up-and-down impedance.

You get over 3 times greater discharge capacity and thermal endurance—plenty of "guts" for withstanding high lightning currents, multiple lightning strokes, long-duration lightning discharges and severe switching surges.

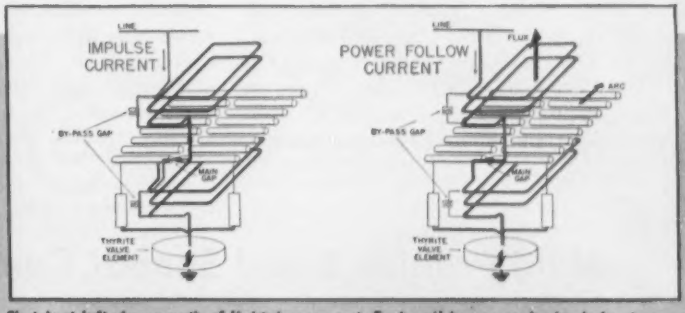
You get greater endurance now—and it protects you for future increasing discharge duty on station arresters attending trends to higher voltage lines, longer lines, greater lengths of cables, and more shunt capacitors, which increase the stored CE^2 energy in switching surges.

For more information about this new station arrester, get in touch with your nearest G-E Apparatus Sales Office or write for Bulletin GEA-1304 to Section 432-5, General Electric Company, Schenectady 5, N. Y.

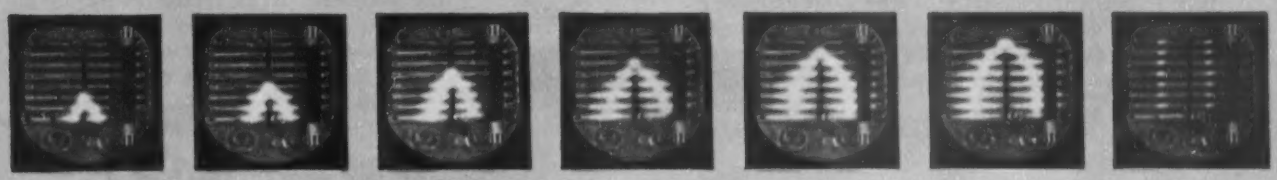
GENERAL ELECTRIC



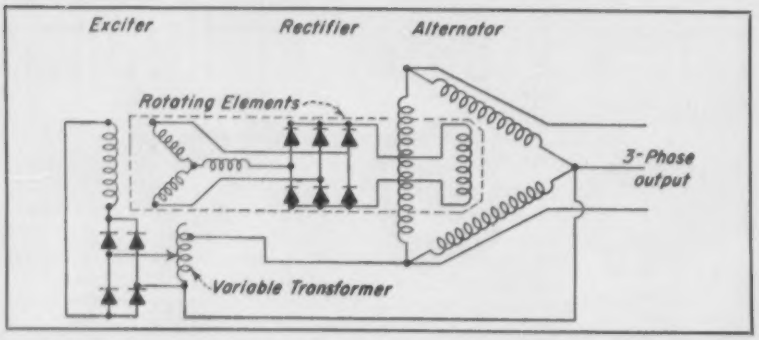
Cut-away view of new arrester showing new gap units and their components. Gap unit (circled in red) consists of 7 pairs of adjacent gap electrodes within the field of 2 magnetic coils. One pair of electrodes constitutes main gap which controls impulse sparkover sensitivity; other pairs of electrodes form multigap path for arc-interruption of the power follow-current.



Sketch at left shows path of lightning current. Each coil has a pre-ionized shunt gap that by-passes lightning current to the discharge path shown in red. Sketch at right shows path of 60-cycle power follow-current. After lightning sparkover, the 60-cycle power follow-current flows through the coils, as shown in red, creating magnetic flux. Arrows indicate direction of magnetic flux and blowout motion of arc, which motion is the same for either polarity of the 60-cycle follow-current wave.



Film strip (from high-speed movies) shows how magnetic force sweeps power follow-current arc progressively from main gap (see extreme left) to as many as 14 multigaps in series (see second from extreme right) for efficient arc-interruption in less than a half cycle. The arc-path moves so rapidly that even hundreds of interrupting operations cause no harmful scarring or burning of gap electrodes.



BASIC PRINCIPLE of applying a rotating rectifier to an alternator has bridge rectifier and exciter on the alternator shaft. Exciter field is fed from a static rectifier and a variable transformer. Each arrowhead indicates 15 rectifier plates in series and 40 plates in parallel

DIRECT CURRENT supply of 750 w at 30 v is fed from this rotating selenium rectifier to the field of a 30-kw diesel-generator set

Rotating Rectifier for Large Alternator is Possible

F. W. PARRISH, Design Engineer, International Rectifier Corp, El Segundo, Calif.

Use of rotating selenium rectifiers on alternators of large capacity is a distinct possibility, based on preliminary estimates. Rotating rectifiers eliminate the commutator on the exciter and slip rings on the alternator shaft. A small-sized rotating rectifier has been used successfully to supply power to the field of a 30-kw diesel-generator set. In this instance the unit delivers 750 w at 30 v.

Normal practice has been to mount the rotating rectifier on the same shaft with the alternator field and the exciter. Output from the exciter, usually 3-phase, is fed into the ac terminals of the rectifier. Output of the rectifier is connected directly to the alternator field windings.

To apply the above system to a 3,600-rpm, 100,000-kw alternator, these preliminary estimates of rectifier requirements have been made:

1. Field power required is estimated to be 6,000 kw at 375 v.

2. A 3-phase bridge circuit has been chosen. If lower ripple is advisable, a 6-phase bridge could be used with no increase in rectifier cost. Ripple would be reduced from about 5% to about 1%.

3. The 3-phase rectifier would have to supply 1,600 amp. If the largest standard rectifier plate (6¼ x 7¼ in.) manufactured today is used, 3,600 plates would be required. The rectifier circuit is shown in the accompanying diagram.

4. Input to the rectifier should be about 340 v line-to-line, 8,050 kva.

Because alternators of this size generally are hydrogen-cooled at temperatures of about 60 C, the rectifier would have to be located at the cool-hydrogen inlet. Maintenance of the inlet temperature below 40 C would also be required. To provide long life for the rectifiers, plate temperatures should not exceed 55-60 C maximum.

For application to large alternators, individual rectifier plates would be mounted to metal disks about 3 to 4 ft in diameter. They would be connected into the usual 3-phase bridge circuit. Thus, 90 disks with 40 plates on each disk would be required for the system.

In the ultimate design, a special plate size and shape is envisioned which could better utilize the space on the rotating disks. Jets would direct the cool hydrogen into the spaces between the disks to effectively force-cool the rectifier plates.

It is also believed practical to use a polyphase transformer with rotating secondary and stationary primary to supply the rectifier. In this way dc power required by the exciter field would be eliminated. Proper design of this transformer could make it independent of speed of rotation of the alternator.

Multi-Position Board Speeds Demand Meter Testing

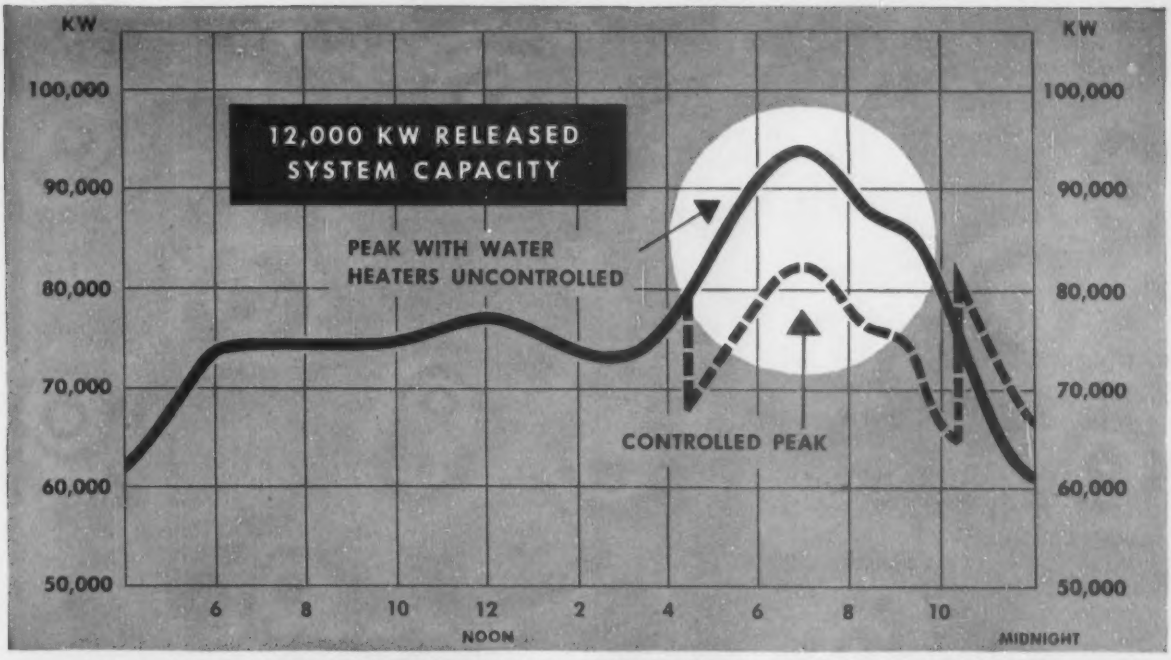
Chore of testing demand meters has been greatly reduced in the system laboratories of Oklahoma Gas & Electric Co by a board which has been built to handle 10 meters at a time. The board has two rows of test positions with five positions in the top row and five positions in the bottom row.

Impulser was made by using a type B-8 motor with extended shaft to accommodate three cams. These cams operate single-pole, double-throw switches giving one, three, or six impulses per min.

Impulser socket has eight terminals and is connected through impulse selector switches to the test positions. One selector switch picks up one or three impulses per min and is connected to the bottom row of test positions. The other selector switch picks up three or six impulses per min and is connected to the top row of test positions. A paralleling switch makes it possible to put any impulse rate into both rows of test positions.

Terminals are of the jack type. No leads are on the board unless there

(*Continued on page* 130)



DAILY LOAD CURVE SHOWS RELEASED LOAD THROUGH USE OF ECONOMICAL G-E TIME SWITCH OFF-PEAK CONTROL

Improve System Operation with G-E Time Switch Control of Electric Water Heaters

The electric water heater load, growing by an estimated 2,400,000-000 KW hours per year, is one of the few loads utility management can control for profitable load building. By automatically cutting off the electric water heaters on your system during peak periods with General Electric time switch off-peak control, you reduce the peak load and receive these benefits:

RELEASED SYSTEM CAPACITY

You can release capacity into your electrical system with time switch off-peak control equal to the number of electric water heaters on your system multiplied by 0.6 KW (average KW demand per heater).

INCREASED SYSTEM LOAD FACTOR

With time switch off-peak control, more kilowatt hours can be sold without exceeding the peak demand, and the return on your system investment is greatly increased.

LOWER INVESTMENT COSTS

To serve new water heater loads, it is unnecessary to install new capacity—your only system investment is in time switch off-peak control.

G-E TIME SWITCH CONTROL

Both of the G-E time switches, the T-43 and the TGW-2, offer low-cost, flexible off-peak control.

FOR MORE INFORMATION

Contact your General Electric Apparatus Sales Office. A representative will be glad to discuss, in terms of your needs, any one of G.E.'s off-peak control systems: combination watthour meter-time switch, 720-cycle control, or time switch. Also write for Bulletins GEC-474A and GEC-705B to Section 603-176, General Electric Company, Schenectady 5, New York.

T-43 TIME SWITCH is lightweight, easily mounted indoors or outdoors; preset at factory to purchaser's schedule; available with external reset.

TGW-2 TIME SWITCH uses same base and cover as Type I-50 watthour meter; accurate setting is simplified by easily-used scalable openings.

GENERAL ELECTRIC

Developments in Instruments for Preventive Maintenance

1 **AVAILABLE FOR THE FIRST TIME,** General Electric's CF-7 hook-on recording volt-ammeter now makes it possible for you to get 30-day records of current, without cutting conductors or interrupting service. This new kind of recorder also gives you voltage records over a wide range. Seven ranges provide a maximum number of applications at a minimum instrument investment (15/75/150/750 amperes; 150/300/750 volts). An external range switch simplifies range changing.

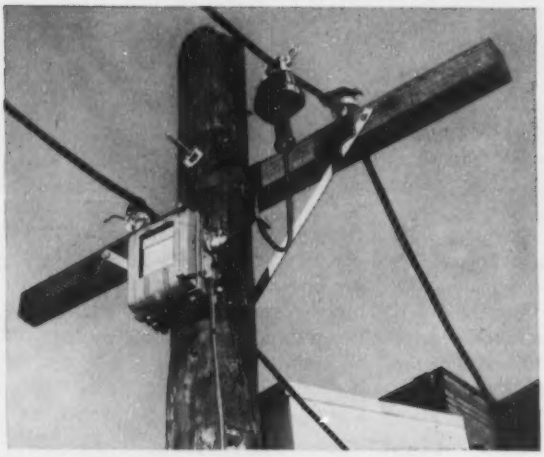
AK-2 MEASURES BOTH WATTS AND VARS

Why General Electric Hook-on Indicators Save You Time

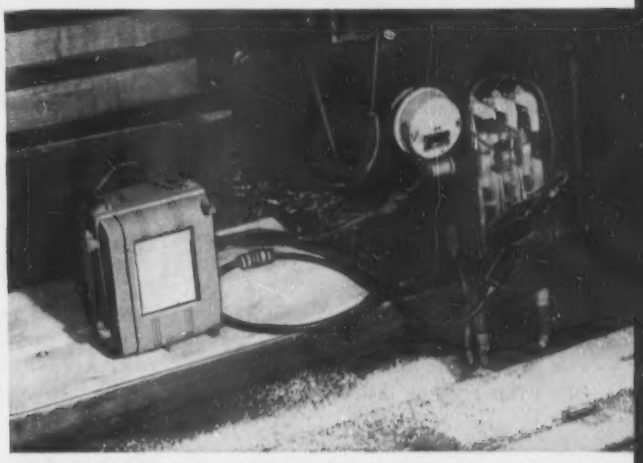
EASY HOOK-ON INSTALLATION and finger-tip range selection are features unique to this G-E wattmeter, which quickly determines single- and polyphase kilowatts and vars in balanced 3-phase circuits. Use the hook-on wattmeter to locate overheated motors before trouble starts. Simply clip voltage leads across lines, hook transformer on to conductor, and read in kilowatts.

Completely New G-E Hook-on Recorder Records Amps Without Interrupting Service

CARRIES ASA INSULATION RATING OF 8700 VOLTS



2 **SAFE AND ACCURATE:** Butyl molding makes possible a transformer insulation rating of 8.7 kv. Even high-voltage circuits may be tested. Calibrated accuracy is ±3% of full scale (4% above 625 amperes).



3 **FAST, CONVENIENT INSTALLATION:** Application of the hook-on principle to the CF-7 makes installation a simple matter. Merely connect the recorder to a suitable power supply, select proper range, and hook on to conductor.

AK-3 INDICATES POWER FACTOR DIRECTLY

SECTION C602-279
GENERAL ELECTRIC COMPANY
SCHENECTADY 5, NEW YORK

Please send me a copy of the bulletin(s) checked below:

.....GEC-901 AK Hook-on Indicators

.....GEA-6104 CF-7 Hook-on Recorder

Name.....

Company.....

Street.....

City..... Zone ..... State .....

NO CALCULATIONS NECESSARY with this handy power-factor indicator. Accurate to within 0.05 PF, the AK-3 provides a direct reading of leading or lagging PF on any balanced 3-phase circuit.

By detecting low PF with the AK-3, you can determine the need for capacitors. Notice that there are no complex connections; just clip on leads, hook on, and rotate dial for reading.

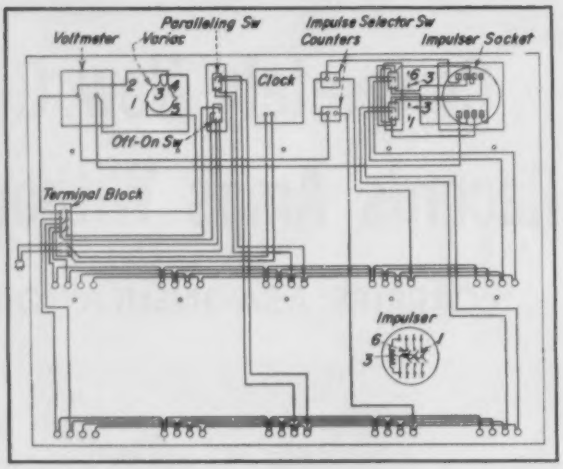
FOR DETAILS on how G-E hook-on instruments can save you time by simplifying measurement, contact your Apparatus Sales Representative or clip and mail coupon for free bulletins.

GENERAL ELECTRIC

Meter Board

(*Continued from page* 126)

TESTING DEMAND METERS, up to 10 at a time, is accomplished speedily in the laboratories of Oklahoma Gas & Electric Co



METER BOARD is connected for flexibility. Impulse selector switch permits switching different impulse rates to meter positions

is at least one meter under test.

Operation of the demand pointer can be checked quickly by a small switch which can be plugged into the terminals to run the pointer up by hand. This checks the arc of the stylus point so that no time is wasted on the time run. This also gives some check on the board operation.

Time test on demand meters depends on the need for meters. A full seven-day period is preferred for the two intervals, 15 and 30 min. For the 15-min interval the test is three days at either 45 impulses per interval, three per min, or three days at 90 impulses per interval, six per min. On the 30-min interval test the bottom row of test positions on the board is used with an impulse rate of three per min, or one per min.

Transfer Switches Aid Metering Coal to Bunkers

F. E. HORNBECK, Plant Engineer, Appalachian Electric Power Co, Cabin Creek, W. Va.

Installation of two transfer switches permits metering the coal to each of three bunkers with a single scale at the Cabin Creek Plant of Appalachian Electric Power Co.

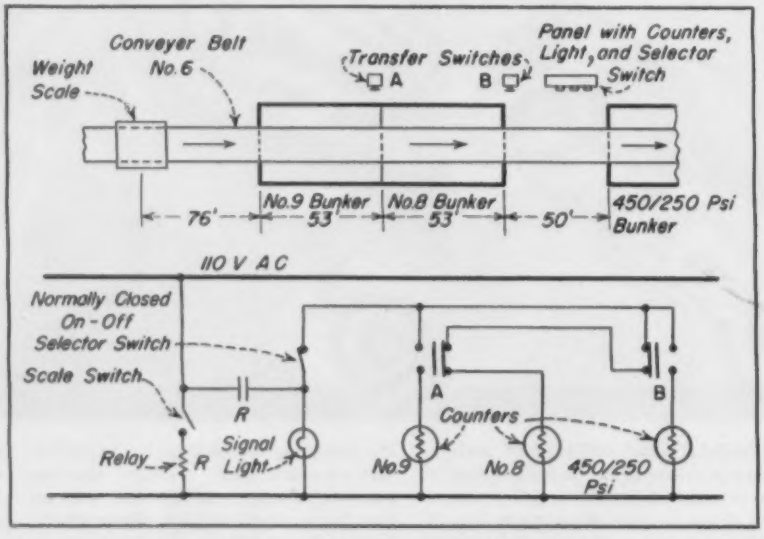
All coal to these bunkers passes over a weigh scale at the head of the belt conveyor. Initially coal for units 8 and 9 was weighed by separate coal scales, and the total coal for six older units was determined from the foregoing readings. Subsequently coal feeders to units 8 and 9 were changed and their coal scales removed from service.

Since this change coal to the various bunkers has been metered by making the following modifications:

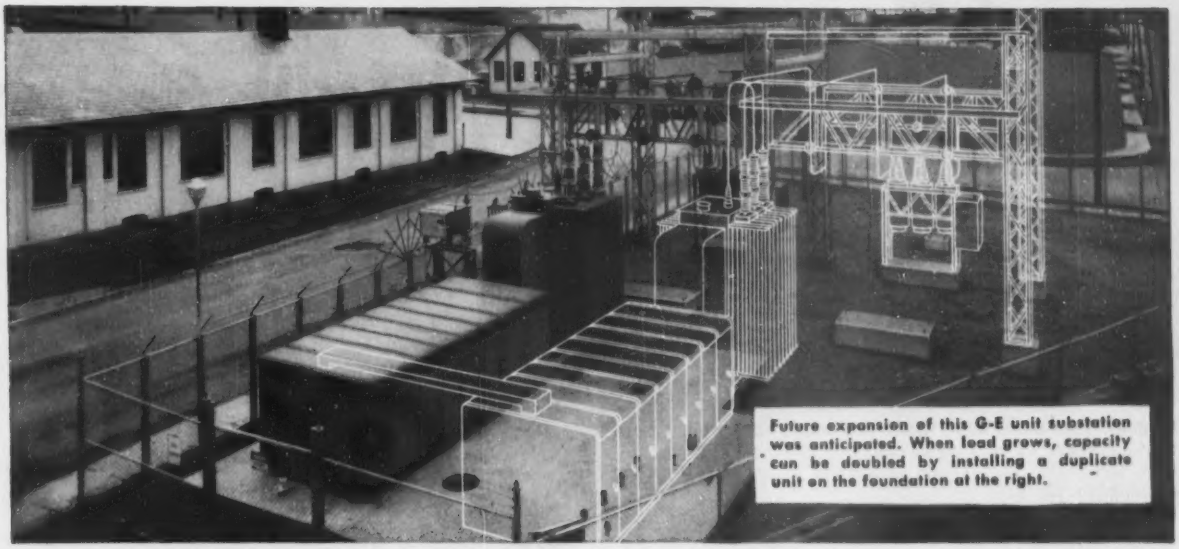
A small switch was installed on the weigh scale to transmit an electrical impulse each time a ton of coal passes on the conveyor. Impulses actuate one of three counters corresponding to the three bunkers. Connection of the proper counter was initially the duty of the tripper operator who positioned a 4-point selector switch according to the bunker being filled. Fourth position of the selector switch was designated as "test" and used when checking the accuracy of the weigh scale.

To eliminate errors that would be caused by manually placing the selector switch in the wrong position, connection of the proper counter to the

(*Continued on page* 147)

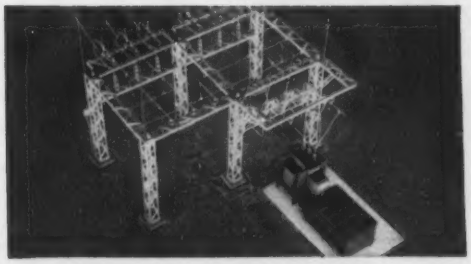


RELATIVE POSITIONS of weigh scale, bunkers, counters, and transfer switches with electrical connections are shown. Impulse counters measure coal tonnage to each bunker. Pilot light blinks each time a ton of coal passes the weights scale. Impulse counters are for boiler units

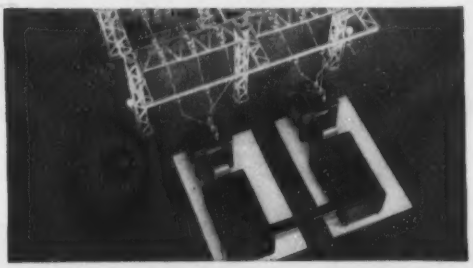


Future expansion of this G-E unit substation was anticipated. When load grows, capacity can be doubled by installing a duplicate unit on the foundation at the right.

This General Electric substation is designed to grow with your load



1954 Single unit is installed, but load growth is anticipated and additional steel structure is also installed at this time.



1956 Capacity doubled to meet load growth. Bus tie provides emergency interconnection to restore service in case of outage on high side.

1958 Capacity tripled as load growth continues. Low-voltage-selective arrangement provides service continuity in emergency.

And with this arrangement, it's easy to—

1. double or triple capacity by adding duplicate units

2. add additional "match and line-up" feeders

3. make connections to the high-tension structure

General Electric unit substations make it both easy and economical to supply growing loads. By adding capacity in small units, as shown at the left, utilities avoid investing in overcapacity which will not be used for years—and which may never be used.

With G-E unit substations, it's easy to increase capacity by simply adding additional units. In this low-voltage selective arrangement, a bus tie with normally open tie breaker provides an emergency interconnection between the low-voltage sides of two or more individual substations. This permits restoration of service following an outage of either a transformer or high-voltage circuit.

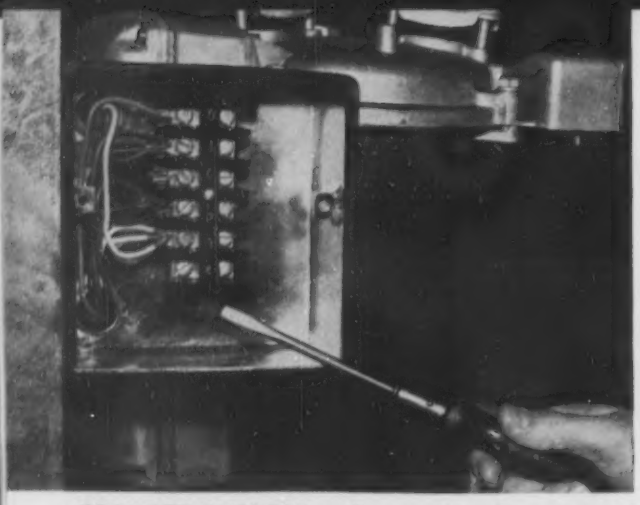
Additional "match and line-up" feeders can easily be added to this design because the ends of the switchgear are accessible—not bottled up as in the case of double-ended substations. Additional match and line-up feeders will be available from the factory for years after the original equipment was purchased.

Standard high-voltage steel structure is another factor in easy expansion. It's easy to add to the structure if more lines are brought in, or if more units are added.

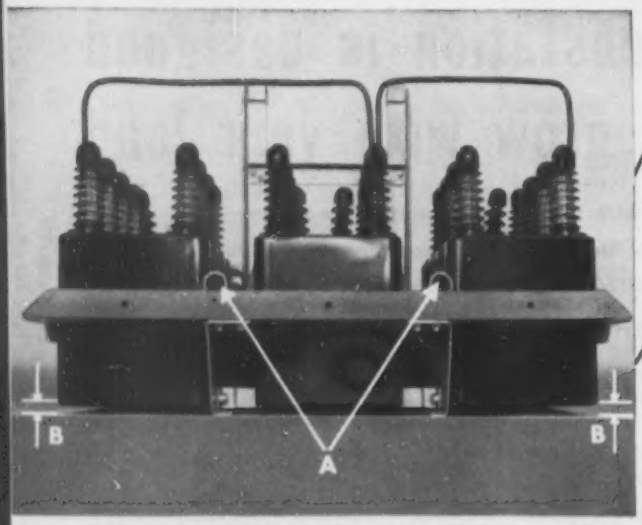
For further information about unit substations that provide easy expansion with a bonus in service continuity, ask your G-E apparatus representative for bulletins GEA-3800 and GEA-5847 or write to General Electric Company, Schenectady 5, New York. 513-2

GENERAL ELECTRIC

You'll find all

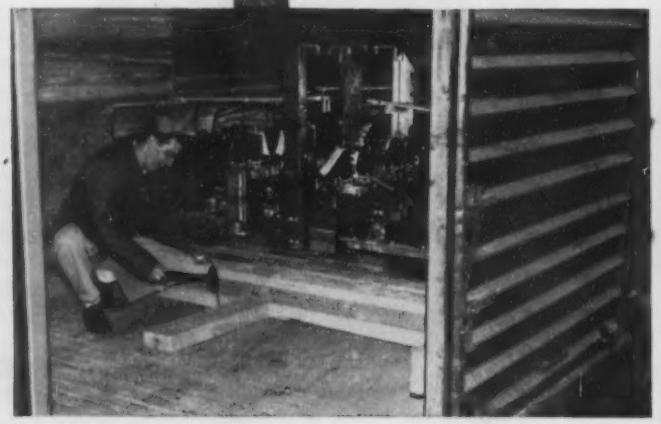


ROOMY TERMINAL BOX, easily accessible, allows plenty of working space for making connections to numbered, clamp-type terminals. Two 1-inch knockouts in bottom provide openings for leads.



FOUR LIFTING EYES, two in front (a) and two in rear, eliminate need for spreader bar; equipment lifts level for easy mounting on pole. Skids provide clearance (b) to prevent scraping bottom of units.

HEX-HEAD CAP SCREWS secure switches and units to frame and simplify removal for maintenance. Three units can be substituted for the switches, making a 375-kvar fixed bank.



SHIPPED ASSEMBLED, in carload shipments, ready to hoist into position upon arriving at the pole. All that needs to be removed is the pallet which is attached with four bolts.

the features you want in new G-E Auto-switch Capacitors

New design helps to simplify installation, speed maintenance; and gives you increased flexibility, more economical service

Based on the suggestions of electric utilities, actual field experience and G-E studies, here are the features you'll need to make your auto-switch capacitor installations easier, increase their flexibility and reliability and cut maintenance problems:

FOR EASY INSTALLATION we've provided skids to protect units from damage, simplify and speed handling; four lifting eyes to facilitate hoisting; ample terminal box with knockouts to simplify control connections; holes for mounting auxiliary equipment, such as lightning arresters, directly on the equipment; and grounding terminals on either side of the frame.

FOR FLEXIBILITY and low maintenance we've included: tapped mounting holes to make it easier to replace switches and units; arranged mounting so that additional capacitors can be substituted for switches, potential transformer or arresters can be mounted on racks and shipped as part of equipment, and so that capacitors and single-phase switches of all major manufacturers can be used interchangeably. In addition we've made the new equipment reconnectable from delta to wye, using the same cable; and made possible the mounting of a single equipment, direct-to-pole, or two equipments side-by-side on the same crossarm.

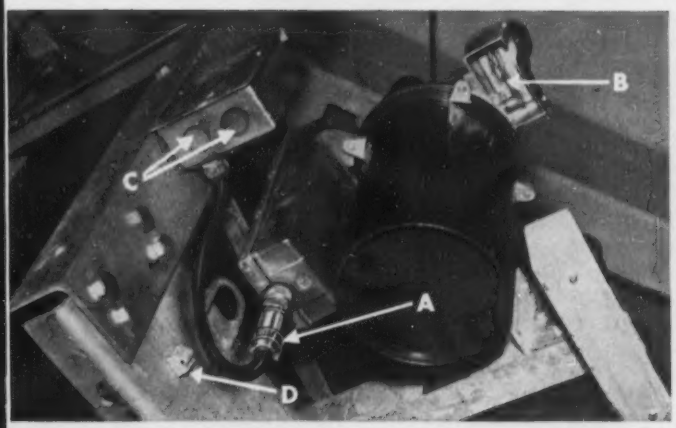
FOR MAXIMUM RELIABILITY we've standardized on capacitors filled with Universal Pyranol* dielectric; heavy-gage hot-dipped galvanized racks to help avoid handling damage, distortion, and minimize corrosion; 5-kv Flamenol* insulated cables and rubber bird caps; and uniform striking distance between bushings of different potential.

This is only a partial listing of the user-convenience features of G-E Auto-switch Capacitors. For complete information, contact your G-E Apparatus Sales Representative. *General Electric Company, Schenectady 5, New York.* 441-12

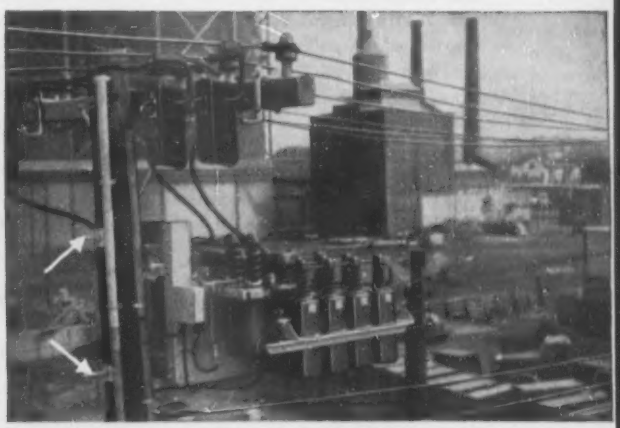
*Reg. Trade-mark of General Electric Co.

Progress is our most important product

GENERAL ELECTRIC



BOTTOM VIEW shows plug-in connector (a). Manual operating handle (b) on switch is readily accessible. Note two knockouts (c) in terminal box. Ground terminal (d) can be on either side of frame.



DIRECT-TO-POLE MOUNTING, an optional design, with two through-bolts (arrows) eliminates need for extra crossarms and makes possible installations on over-crowded poles.

How to Weld Covers to Transformer Tanks

This procedure is an adaptation from Work Method Standards of Boston Edison Co.

Material Specifications

Cover is fabricated of universal mill or sheared steel plate, ASTM Designation A7-50T or latest revision. Tank is same material and has 1⅞-in. wide flange to meet cover 1½-in. wide flange. Cover is ½-in. thick plate, has ⅝-in. dia cold-rolled handle 11¼ in. long and 2½ in. high, and has porcelain enamel finish underneath except at 1½-in. wide outer flange. Tank cover outline is shown for 75 and 100 kva transformers.

One 300-amp welder; ¼ in. electrodes, ASTM classification E60 or equivalent, and usual welding accessories are required.

Preliminary Testing of Threaded Joints

1. After assembly of transformer, bushing sleeves and fittings, and prior to welding, test all threaded joints for leaks under air pressure, as follows:

2. Clamp cork gasket and steel plate to tank flange.

3. Assemble test fitting with pressure gauge through sampling hole and connect air hose. When tank pressure is 3 psi, remove hose and tighten clamps for minimum air loss at the gasketed joint.

4. Using overhead crane, gradually lower transformer into water tank until water is just above level of bushing pockets. Search for air leaks while maintaining 2 psi min.

5. Withdraw the transformer from the tank.

6. Seal leaky joints and retest until tight. (To pinpoint leaks preliminary to immersion, brush soap suds on joints and inspect for tell-tale bubbles).

7. Remove test fitting, clamps, test plate and cork gasket.

Applying Cover Gasket

8. Chip, grind and brush irregularities and scale remaining on the tank flange and underside of cover from previous weld removal operations. Using a cloth dampened with carbon tetrachloride, wipe all grease and dirt from tank flange and edge of cover.

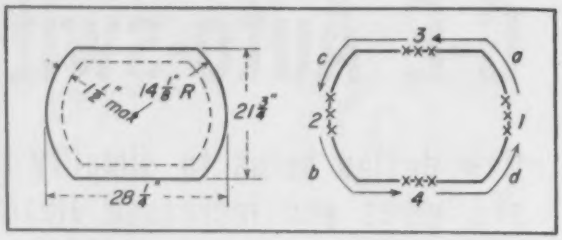
9. Apply gasket cement sparingly and at maximum intervals along gasket seat on cover. (Gasket shall later be laid with one edge ¼ in. from edge of cover.) Allow cement to set until tacky (about 10-15 min).

10. Remove gasket from its container and, if other gaskets remain, reseal the container. Stick gasket in place (step No. 9) mating ends cut diagonally, and with inside edge notched so gasket will lay flat.

11. Wrap asbestos blankets around tank to protect leads and wipes from accidental contact with electrode.

12. Clear area of material ignitable by sparks. Avoid welding in area where paint vapors accumulate. Determine that a fire extinguisher is readily available. Set the canvas screen so that maximum protection is afforded other workers and equipment.

Procedure for removing welded steel covers from tanks will be outlined in Engineering Reference Sheet No. 54-13



TANK COVER dimensions and welding sequence

13. Lower cover and center it on tank flange. Loosen oil-filling fitting. (Vent tank so that presure cannot be built up within the tank and so weaken the weld).

14. Set welder current control at approximately 200 amp. (Size of the arc may later be adjusted). Attach ground clamp to convenient portion of tank.

Welding Operation

15. Apply wood clamps to cover and flange so as to compress entire gasket by a uniform amount.

16. Start welder and tack cover to flange in sequence 1, 2, 3, 4 as shown in sketch. Then remove clamps.

17. Lay bead (a) between tacks 1 and 3 in direction shown. Repeat for beads b, c, and d. NOTE: Be sure sufficient length of electrode is available to make corners without breaking arc. When weld has cooled, chip and brush loose slag and scale from weld.

18. Lay heavy second bead in continuous pass around cover but in opposite sequence in steps 16 and 17. Then clean the weld.

Testing Weld

19. Remove asbestos blankets, also oil-filling fitting and assemble air test fitting with pressure gauge.

20. Connect air hose to test fitting. When 6 psi air pressure is obtained within the transformer, remove the air hose. Using an overhead crane, gradually lower transformer into water tank until it is completely immersed. During lowering, watch for air bubbles or a drop in air pressure as indicated by the test gauge. Mark a leak location with colored crayon and proceed with the immersion. While transformer is being immersed, pressure must not drop below 2 psi.

21. Allow transformer to be immersed long enough for leaks to be evidenced by a drop in gauge pressure.

22. Remove transformer from water tank and wipe cover until dry. Remove test fitting and replace oil-filling fitting carefully so that water does not enter transformer.

23. Transformers which leak elsewhere than at the juncture of cover and flange or at threaded joints, shall be set aside and the foreman notified.

24. Leaks at the cover weld shall be patched with weld metal where marked and air tested (step 20).

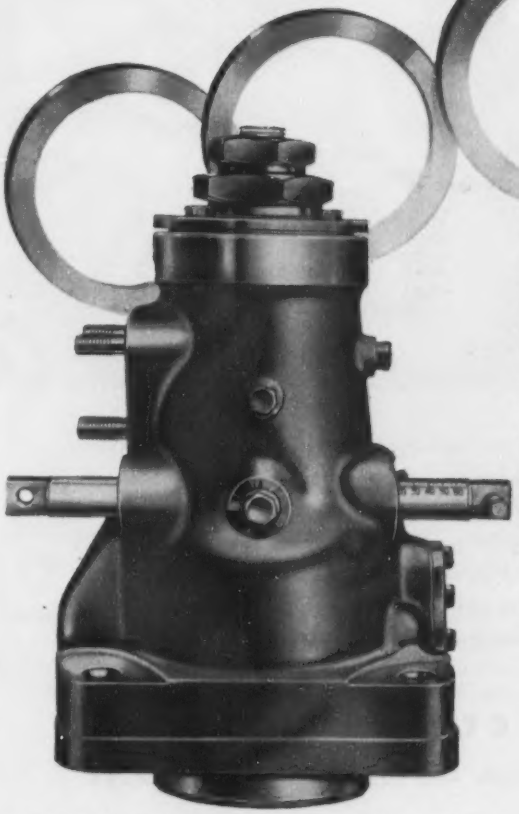
Finish O.K.

25. Paint all exposed zinc or steel with two heavy coats of subway black.

This advertisement first appeared about a year and a half ago. It is repeated because the customer has since reported that gasket performance in this rugged service proved extremely successful since adopting gaskets made from Revere Deoxidized Copper Tube.

IT PAYS TO CONSULT REVERE.

TO MAKE HEAVY-DUTY COPPER Gaskets USE REVERE DEOXIDIZED Tube!



Diesel Fuel Injection Pump, made by American Bosch Corp., Springfield, Mass., and gaskets made by cutting rings off 2" deoxidized copper tube.

● An important extra service rendered by Revere consists of collaboration in setting up specifications. This is valuable because there are many different Revere Metals, each with special characteristics. No one copper, for example, will serve to best advantage in every application. A case in point is the matter of copper gaskets for Diesel fuel injection pumps. Copper is of course an ideal metal for gaskets, and is widely used for that purpose. But for this special application, which copper and in what form? The pump is used on large engines for municipal generating plants. It weighs 186 pounds, and must produce the high pressure required to inject fuel near the top of the Diesel compression stroke. Naturally, the load is a pulsating one. American Bosch Corporation came to Revere with the problem. Our suggestion was that much scrap could be saved if the gaskets were made by cutting rings off copper tube, instead of stamping them from strip. This achieved a double purpose, since the tube is made of deoxidized copper, which is superior in this application to electrolytic. We are able to report that these recommendations proved successful. . . . This work was done by the Revere Technical Advisory Service. To get in touch with it, see the nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

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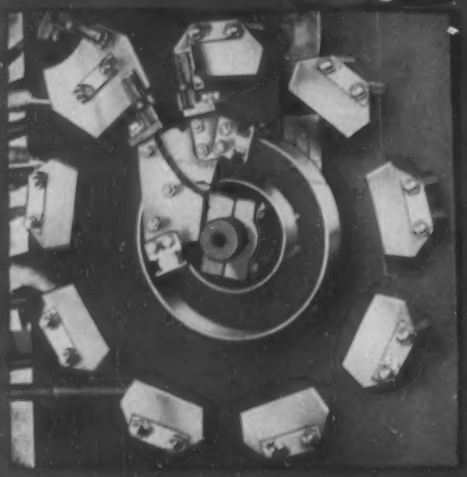

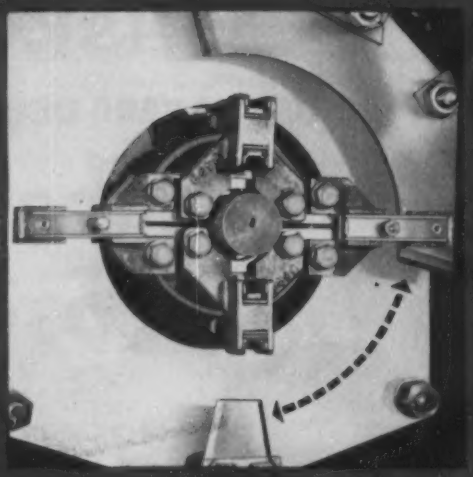

Versatility is a wonderful thing if it is practical. Moloney Underload Tap Changer Equipment combines both practicality and versatility because it is a self-contained mechanism highly flexible for adaptation to many special applications. Unusual operation or installation conditions pose no problems which consultation with our Engineers cannot overcome. The Moloney Underload Tap Changer with the exclusive principle of "reactor by-pass switching" eliminating reactor loss and voltage drop can be integrated into an engineered unit especially suited to efficient operation within *your* system.

MEB4-12

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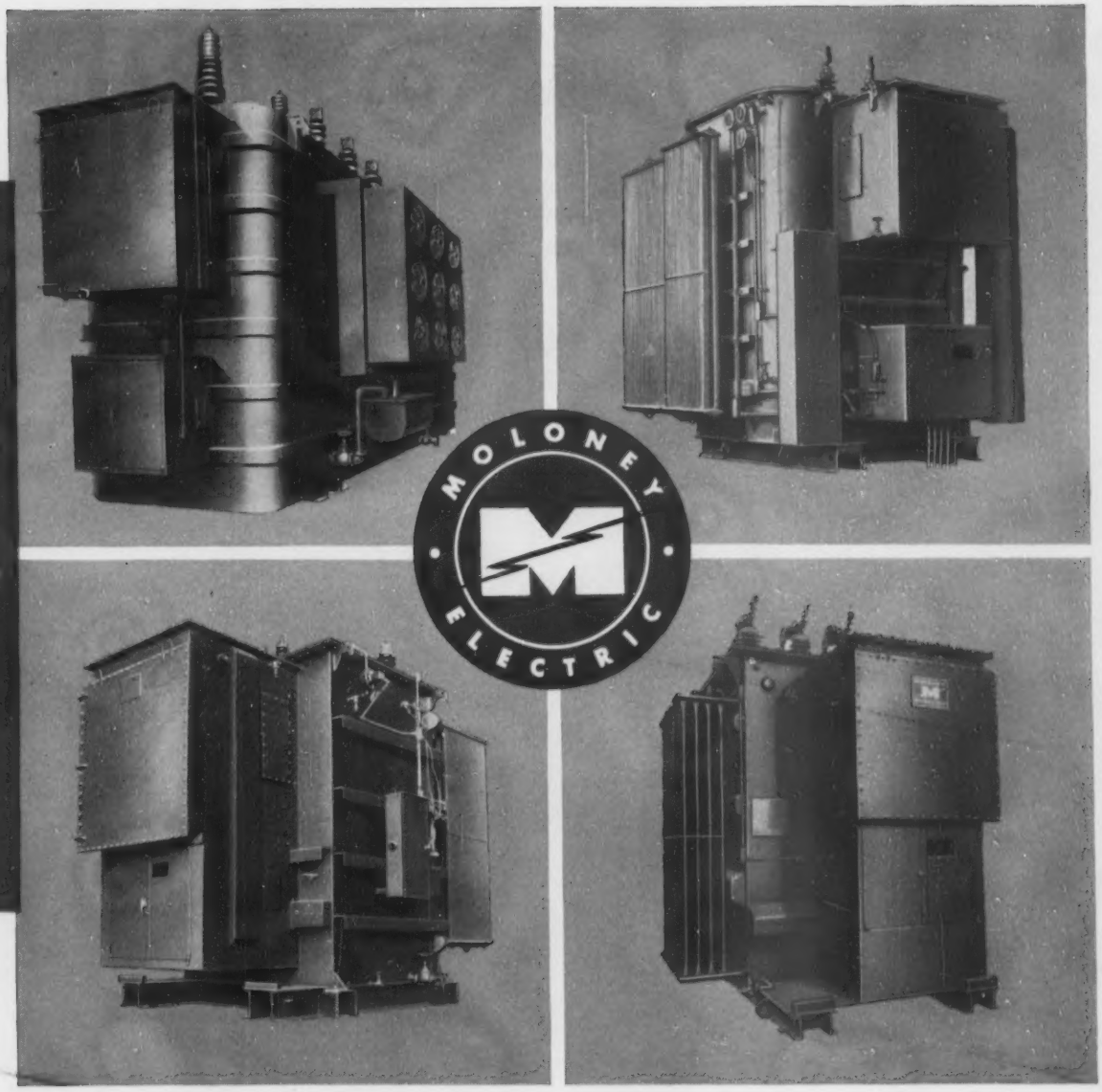
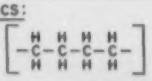
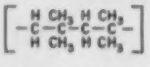
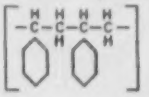
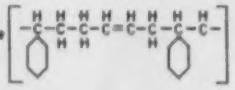
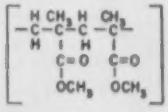
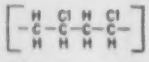
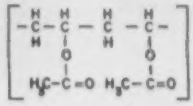
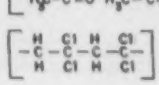
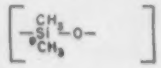
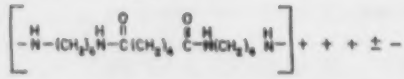
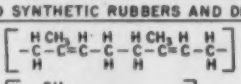
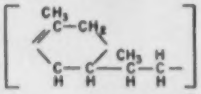
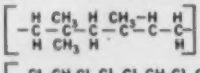
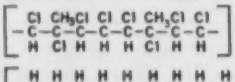
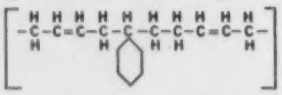
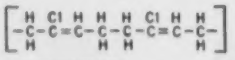
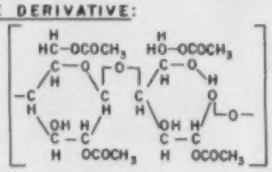
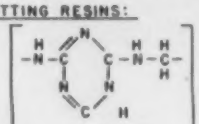
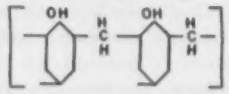
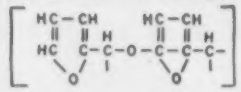


Moloney offers a complete line of regulating equipment which can be had in any Kva and voltage rating. Whatever your system requirements may be—great or small—Moloney Underload Tap Changer Equipment is available to help add efficiency and dependability to your service.

Transformers • Step Voltage Regulators • Unit Substations • Electronic Transformers

Plastics: Molecular Structure and Chemical Resistance

Chart is an aid in evaluation of some plastics as protective coatings for electrical equipment

Product	Formula	Resistance: Water	Organic Solvents	Salts	Alkalies	Acids	Oxidizing Compounds
THERMOPLASTICS:							
Polyethylene		+	−	+	+	+	+
Polyisobutylene		+	−	+	+	+	+
Asphalt	Polycyclohydrocarbons	+	−	+	±	+	+
Coal Tar Pitch	Aromatic Hydrocarbons	+	−	+	+	+	−
Polystyrene		+	−	+	+	+	−
Styrene Butadiene Copolymer		+	−	+	+	+	−
Polymethyl Methacrylate		+	±	+	+	+	−
Polyvinyl Chloride		+	±	+	+	+	+
Polyvinyl Acetate		±	−	+	−	−	−
Polyvinylidene Chloride		+	±	+	+	+	+
Silicone		+	−	+	−	−	−
Nylon		+	+	+	±	−	−
NATURAL AND SYNTHETIC RUBBERS AND DERIVATIVES:							
Natural Rubber		+	−	+	+	+	−
Isomerized Rubber (Thermoprene)		+	−	+	+	+	−
Butyl Rubber		+	−	+	+	+	+
Chlorinated Rubber		+	−	+	+	+	−
Styrene Rubber		+	−	+	+	+	−
Neoprene		+	−	+	+	+	−
CELLULOSE DERIVATIVE:							
Cellulose Acetate		+	−	+	−	±	−
THERMOSETTING RESINS:							
Melamine Resin		+	+	+	+	±	−
Phenolic Resin		+	+	+	−	+	−
Furan Resin		+	+	+	+	+	−

+ = No apparent attack under normal conditions ± = Attack by some, not all chemicals in this class under normal conditions − = Considerable attack under normal conditions

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Providing maximum service continuity for commercial areas

Service continuity is mighty important on Main Street, U.S.A. Few people are more aware of this than R. F. Lawrence, Westinghouse Distribution Engineer. Bob has helped many utilities design and build distribution systems. On the following pages, he presents some considerations on system design and equipment that can point the way to maximum service continuity.

Secondary networks meet Main Street's exacting power requirements

Today, as we all know, electric power is the lifeblood of Main Street, U.S.A. Main Street needs power—reliable, well-regulated power—to operate efficiently. More importantly, Main Street needs power to grow—to provide air conditioning, high-level lighting, new electrical devices—the modern services that can mean the difference between a thriving or a perishing business community.

This, then, is our joint challenge—and opportunity. How well we meet it will be told in the load growth records of future years.

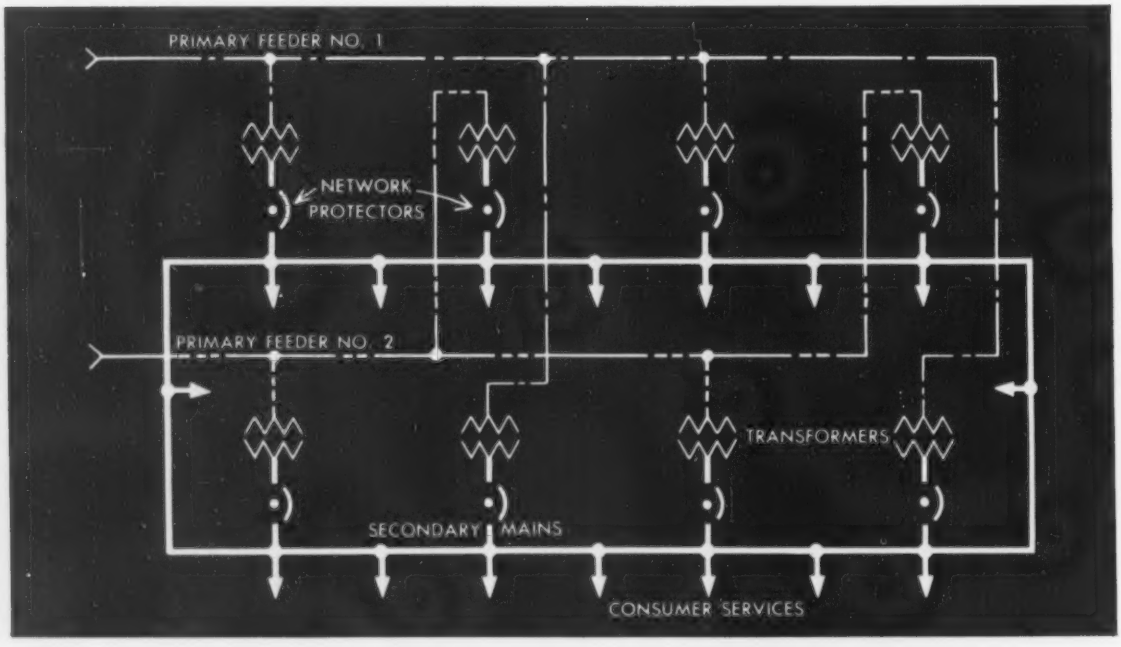
One answer is the use of a-c secondary networks. It's not a new answer, of course, but secondary networks still provide greater service continuity, greater flexibility and permit faster, more economical load expansion than any other distribution system. Further, steady progress in the development of network equipment has opened up several new fields of application for secondary networks.

One of these is the application of both underground and overhead networks to medium-density loads in suburban shopping centers and cities with populations ranging from 25,000 to 100,000. Another—and potentially the most important to you in terms of load revenue and growth—is the application of overhead light-duty networks in smaller cities and towns with populations as low as 5000. All eyes are on Wapakoneta, Ohio, where the first such system is now in operation.

Westinghouse was among the first to recognize the importance of a-c secondary networks in commercial area distribution—an importance that steadily grows with the greater use of electricity. In cooperation with the utility industry, we did much of the basic network system engineering—developed the automatic network protectors and other specialized equipment that made networks possible.

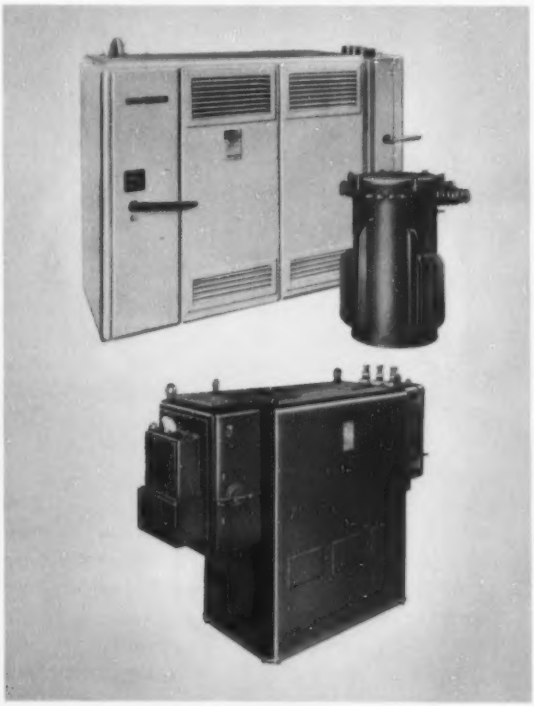
Now, let's see what Westinghouse offers to help solve your commercial area distribution problems. For a starter, let's consider network transformers.

Simplified schematic of a light-duty overhead secondary network system. Use of primary feeders which supply areas other than the commercial area network makes for greater economy.



YOU CAN BE SURE...IF IT'S

Henry Gates, Section Manager, Network Transformer Engineering and Bob Lawrence discuss some of the distinctive features of the new disconnecting and grounding switch.



Top: 1000-kva, ventilated, dry-type network transformer—an ideal type for building installations. **Middle:** Conventional pole-mounted distribution transformer used on light-duty overhead network systems. **Bottom:** 300-kva, submersible, dry-type network transformer.

New primary switch matches reliability of network transformers

The degree of service continuity on the load side of your network system is directly dependent on the reliability of your network transformers. That's why the high quality of Westinghouse network transformers is vitally important to you.

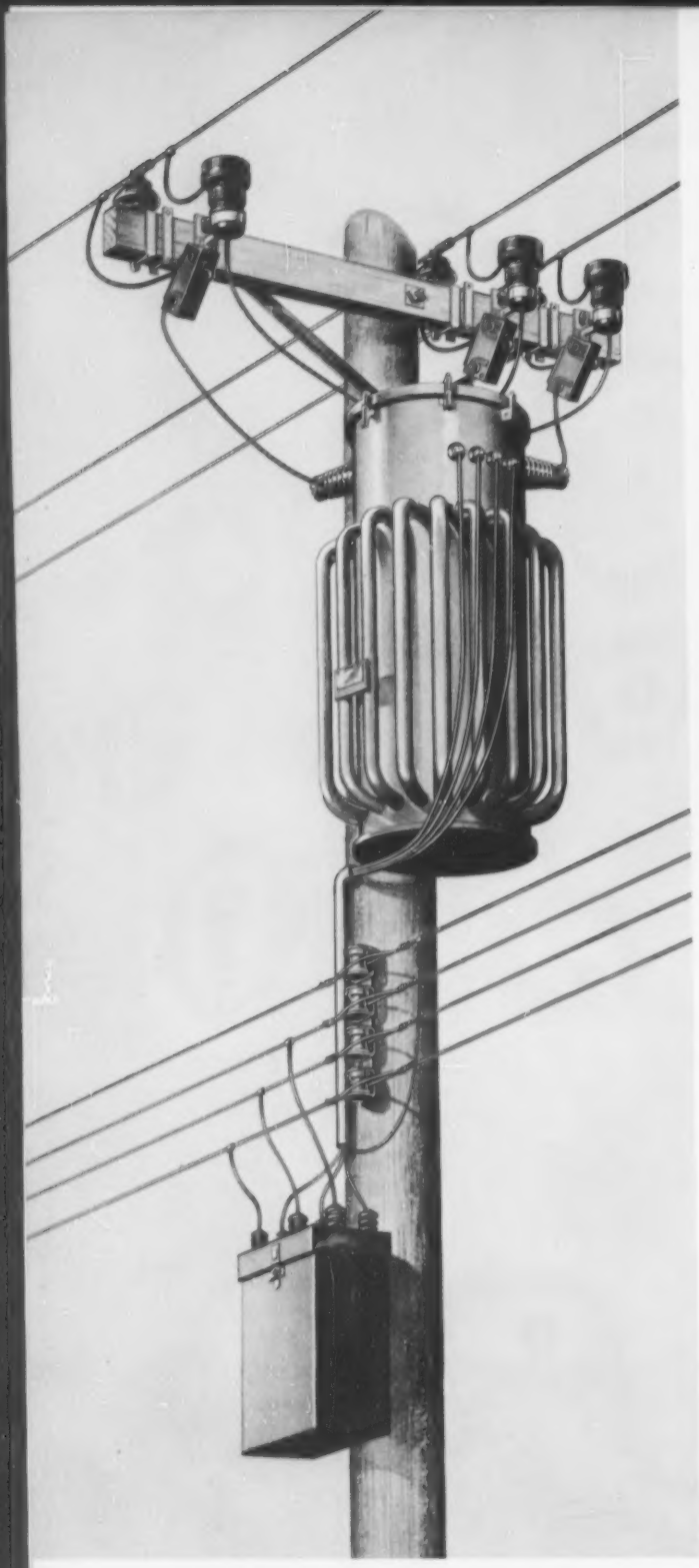
The new high-voltage disconnecting and grounding switch is typical of the extra reliability built into every Westinghouse network transformer. It enables you to isolate any transformer or ground a section of a feeder for maintenance or tying-in a new transformer.

You can count on safe, positive operation of this new Westinghouse primary switch since the contacts are kept perfectly and permanently aligned. This is accomplished by new and exclusive Westinghouse methods of positioning both stationary and rotating contacts to match perfectly at all times. As a plus feature, all contact bushing hardware is rolled on to assure a perfect seal between terminal and switching compartments.

Westinghouse network transformers are constructed with Hipersil® cores and continuous wound

(Continued on next page)

Westinghouse



Typical light-duty overhead network installation—CM-88 network protector mounted on a pole below a distribution transformer. Note the neat appearance of this installation.

(Continued from preceding page)

coils. This provides a smaller and more rugged core-coil assembly with optimum iron-to-copper-loss ratio required by the network system.

Westinghouse offers four basic types of transformers for use on secondary networks: (1) the submersible dry-type network transformer, with all the advantages of dry-type construction, suitable for locations subject to flooding; (2) the ventilated dry-type network transformer, offering maximum safety for dry locations without requiring vault construction; (3) the standard liquid-filled (oil or Inerteen®) network transformer, which is available in vault type for occasional submersion and subway type for periodic submersion; and (4) the conventional pole-mounted distribution transformer, for use on the light-duty overhead network system. The first three network transformers generally use transformer-mounted protectors; the light-duty network uses separately mounted protectors.

Relay design . . . vital to network protector performance

The focal point of any a-c secondary network system is the relay that controls the automatic network protector. Thus, the design and performance of this relay is a matter of vital concern to you.

Westinghouse network protectors use a three-phase induction-type relay—the CN-33—that's superior in every detail of its design. Gearing has been eliminated—and with it a potential source of trouble. Knife-edge bearings on the drum shaft prevent dirt accumulation—minimize wear. Permanent magnets prevent contact bouncing. Terminals are front-accessible—terminal screws can be used as test switches, greatly facilitating testing and adjusting the relay when mounted on the protector. The relay can be removed and remounted with no danger of improper connection. This compact, dependable relay is used on *all* Westinghouse network protectors.

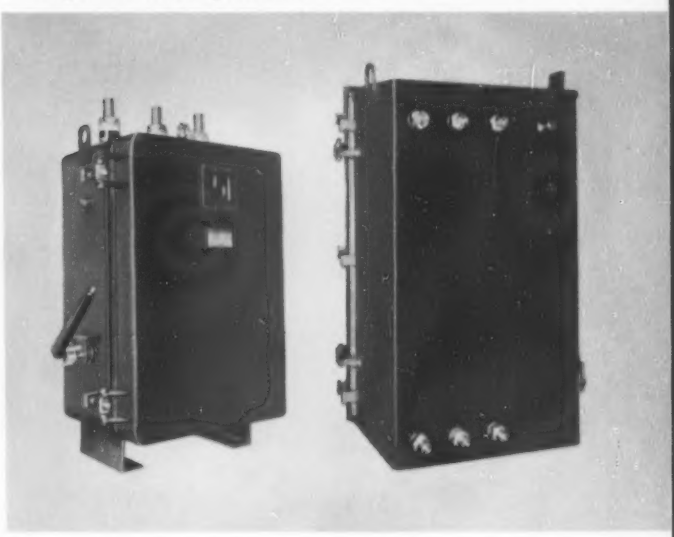
Westinghouse protectors save on operating costs, too. Thanks to De-ion® arc chambers that extend contact life and the sturdy relays, maintenance is required only about once every two years. Relay settings are the only adjustments needed. Quick-

Gene Miller, Network Protector Sales Engineer (right), with Hank Lokay and Bob Lawrence of Utility Engineering look over a 75-kva CM-88 light-duty network protector. Gene is pointing out the 3-phase master relay used in all Westinghouse network protectors.

opening housings, captive hardware and exclusive dual-motion hinge assure fast accessibility.

Westinghouse offers you three classes of network protectors which cover every distribution need: the CM-22 heavy-duty protector in either a submersible or a ventilated housing; the CM-44 medium-duty unit in either a submersible, ventilated or weatherproof housing; and the new, exclusive CM-88 light-duty unit in weatherproof housing for overhead network service.

Another important factor affecting network service continuity is overloading. Westinghouse can help you lick this—economically—with the new secondary network capacitor, which is discussed on the following page.



Left: 1600-ampere, vault-type CM-22 network protector. **Right:** 600-ampere, weatherproof CM-44 network protector.

Westinghouse

New network capacitor reduces overloading, improves continuity

A constant threat to service continuity in commercial areas is overloading of network conductors and apparatus caused by rapid load growth. Heavy additions of air conditioning and wider use of electrical conveniences have made overloading a problem on many networks.

Now, Westinghouse has developed a secondary network capacitor that will help you meet this threat—more quickly and at less cost than adding cable or transformers. This is a compact, 13⅓-kvar, 216-volt unit that meets all the severe requirements of underground operation.

A new terminal-mounted, current-limiting type fuse renders the fuse operation virtually independent of the fault current capacity of the system, thus fully protecting the capacitor from high fault currents and avoiding service shutdowns. The design of the fuse enables it to be sealed—along with the terminal connection — in a watertight Neoprene sleeve, thus permitting submersible operation of the complete assembly.

The network capacitor is specially designed to operate in 55°C ambient temperatures, compared with 40 to 50°C for conventional units. For corrosion protection, the steel case is sprayed with molten zinc to a depth of 8 mils, which is then permeated with an organic finish. So protected, it has a life expectancy of 10 years fully immersed, or 25 years in a dry vault—*without maintenance.*

Due to their compactness, Westinghouse network capacitors require only 60% as much vault space per kvar as other available units. They may be obtained in single units or factory-assembled and wired in galvanized racks that will clear a 30″ manhole. Mounting arrangements are completely flexible.

W. H. Smee, Underground Foreman, Alabama Power Company, points out some of the advantages of this Westinghouse network capacitor installation in downtown Mobile. It's highly accessible—takes up little room—operates completely submerged—a necessity in this location. This factory-assembled and wired capacitor equipment, rated 120 kvar, is installed in conjunction with a Westinghouse 500-kva network transformer.

YOU CAN BE **SURE**...IF IT'S

Here, Guy Metzler, Manager of Unit Equipment, discusses a model of a double-bus spot network situation.

Continuity starts with reliable power supply

For completely reliable power distribution in commercial areas, you've got to consider the link in the chain ahead of the secondary network system—the source of power supply.

If you use distribution substations to feed network primaries, your best choice for maximum service continuity is a Westinghouse unit substation arranged in either double-bus or single-bus spot networks. DH air circuit breakers have fast, safe De-ion arc extinction; drawout for easy inspection; are completely interchangeable for quick replacement. The transformers add good regulation to service continuity through automatic tap changing under load.

By locating Westinghouse unit subs close to the center of your network load, you'll save on copper, get better regulation and reduce power losses. And you'll make it easy to expand or split your networks with these attractive, compact substations. To add a feeder, all you have to do is add the compact switchgear unit. The substation can be moved simply and inexpensively.

4000-kva spot network substation with in-line single bus.

An important consideration for future network system design is heavily concentrated electrical loads. Westinghouse engineers have studied this—and propose a practical solution on the next page.

Westinghouse

Westinghouse studies indicate higher network voltages for concentrated load areas

Since 1922, Westinghouse has pioneered the development of 120/208-volt secondary networks for both underground and overhead systems. But, in recent years, the increasing concentration of electrical loads in downtown areas and, particularly, in large commercial buildings has raised this question: Is the use of higher network voltages in such areas desirable—and economically practical?

The answer is emphatically yes! Recent studies by Westinghouse of the basic principles involved show that 265/460-volt secondary networks for high load concentrations offer important advantages to both utilities and power users. To the utility, substantial economies are indicated through the use of higher rated equipment, which means lower cost per kva and more efficient transport of power at the higher voltage. For the user, there are definite cost advantages in higher voltage distribution systems and in direct feeding of large motors for air conditioning and 265-volt fluorescent lighting.

Studies like this indicate the continuing leadership of Westinghouse in commercial area distribution. We are constantly striving to improve both equipment and methods of distributing power . . . to the end of helping you serve your customers better. Why not use our experience to help you plan for maximum service continuity in your commercial areas? You can start the ball rolling by calling your nearby Westinghouse representative. CP-1019

YOU CAN BE **SURE**...IF IT'S Westinghouse

For detailed information on Westinghouse network equipment, call your Westinghouse representative. Or fill in this coupon and mail to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

Gentlemen: Please send literature checked below.

- ☐ Network Transformers . . . . . **DB 48-600. D, L, SD**
- ☐ Network Protectors **CM-22** **DB-35-550**
- ☐ **CM-44** **DD-35-600**
- ☐ **CM-88** **B-3977**
- ☐ Network Capacitors **DB-49-330**
- ☐ Unit Substations **B-4061**

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Title_____

Company_____

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City_____ State_____

CP-1019

Metering Coal

(*Continued from page* 130)

impulse switch was made automatic as follows:

Trigger-operated transfer switches A and B (See circuit diagram) were installed overhead near the electric monorail which serves the coal tripper, and a micarta finger was attached to the tripper trolley to trigger the proper transfer switch. The "on-off" switch was formerly the 4-point selector which was rewired; "off" position is used for checking the weigh scales accuracy. The signal light blinks every time the small switch transmits an impulse.

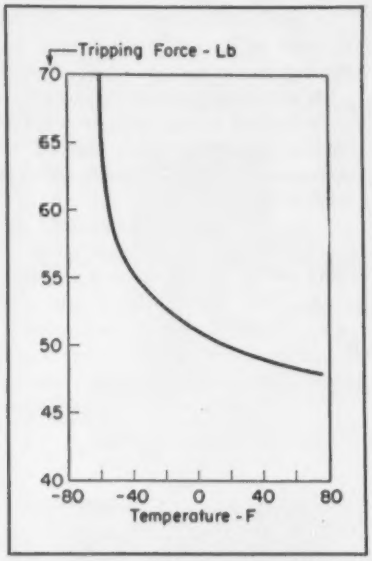


FIG 1—TRIP PLUNGER FORCE is shown for trigger bearings with low-temperature grease

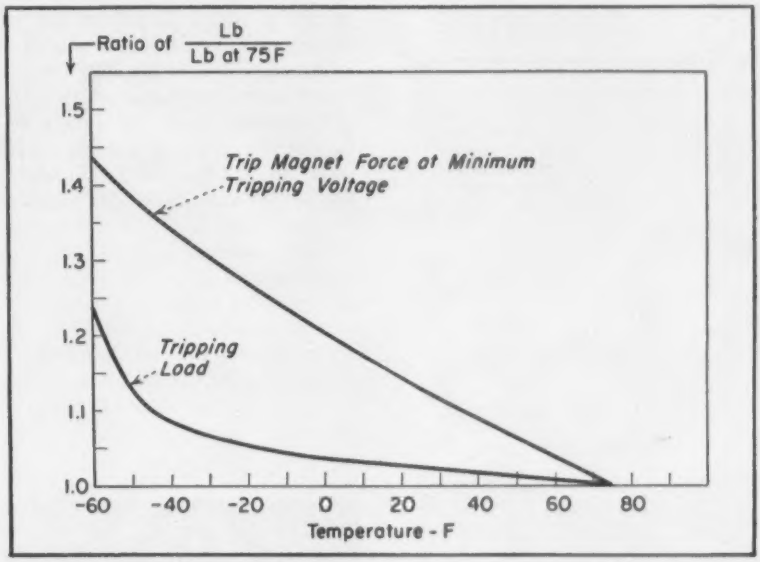


FIG 2—TRIPPING LOAD AND FORCE increase with lower temperature. However, because of the decreased electrical resistance, trip coil force is considerably greater than load

Outdoor Oil Circuit Breaker Modified for -60F

C. E. LeROW, Jr., Power Circuit Breaker Engineer, Westinghouse Electric Corp, East Pittsburgh, Pa.

Outdoor, pneumatically-operated oil circuit breakers for "satisfactory performance at temperatures down to -60F" in Alaska were ordered recently from Westinghouse Electric Corp. The buyer's specification posed engineering problems for the manufacturer.

Economy and standardization stress use of standard equipment wherever practicable, and the application of heat when low temperatures require it. Heating is particularly feasible when extremely low temperatures are not expected to prevail over long periods. The heat, however, must be applied to both the oil in the breaker tanks and to the mechanism assembly.

Consequently, thermostatically-controlled tank heaters were installed in each breaker tank with the conduit leading to the operating mechanism housing. These heaters keep the tank oil at a safe operating temperature above the maximum pour point.

Infrared lamps and strip heaters, mounted close to and focused on the mechanism control valve, insure proper operation of the control system and provide heat in the enclosure. As long as the temperature differential is maintained between the inside and outside of the enclosure, condensate will not form within the housing. Danger of water freezing on operational parts is eliminated.

Should maintenance be required during extreme temperatures, work can be carried on under a heated canopy around the mechanism housing.

An extruded seal of a special neoprene compound that remains flexible at -60F was used for weatherproofing the mechanism doors and shock mountings. This seal was developed with the cooperation of the supplier.

When relays and pressure switches were operated at 10-deg steps down to -76F, the relays performed flawlessly. However, the factory-applied grease in the pressure switches froze solid and prevented the switches from operating. Since the switches control the air supply for operating the breaker and act as alarm and cutoff devices, a remedy had to be found. A special grease, suitable for the range of temperature operation, was substituted for the factory-applied grease.

The motor and compressor unit, after the compressor oil had been thinned with kerosene, was found satisfactory for breaker performance even when the unit as a whole had been kept inoperative for several hours at -65F.

Mechanism trigger bearings, lubricated with low-temperature grease, were tested in a cold chamber and forced under load to rotate or slide on the pin. Tripping force measured at the trip plunger for trip-free operation varied with temperature, as shown in Fig 1.

Roller bearings, on which the trigger and roller of the trip-free lever are mounted, were checked to determine whether cold weather would cause them to become inoperative. A latch and trigger, mounted in a

what's NEW in Engineering

A new type of glass lathe is said to handle specialized glass work in labs and some production operations. It can be used to make ring seals, flanges, closures, glass fusings. A novel sleeve grip chuck allows quick set-ups of practically all forms of glass work without elaborate accessories.

How to quench a city's thirst. Faced with the future problem of serving 100,000 people, the City of Vallejo, California, engaged Kaiser Engineers to design and direct construction of a water system that would supply 21,000,000 gallons per day to the city. This

$6,000,000 project included 36 miles of pipeline, pumping and treatment plants, reservoirs and a distribution system. Reprints of this story are available upon request.

Relaxation Methods by D. N. de G. Allen, recently published by McGraw-Hill, explains how to use the Relaxation Method to solve various mathematical problems which arise in engineering science and applied physics. It covers in detail such recent advances as three-dimensional relaxation.

Kaiser Engineers has a large staff of engineering and construction experts ready to tackle your problems in all fields of design, engineering and construction. Call or write: Kaiser Engineers, Division of Henry J. Kaiser Company, Kaiser Building, Oakland 12, California.

mechanism frame and loaded to a service value, were put into a refrigerator and the temperature reduced to -60F. The force for tripping, it was found, increased about 23%.

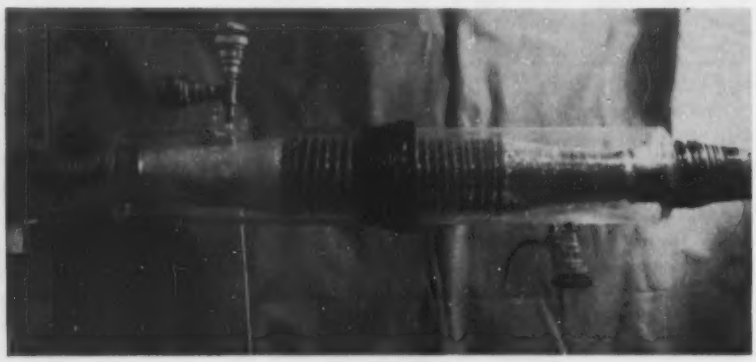
However, because of lowered electrical resistance, available force exerted by the trip coil increased relatively more than the tripping load. As shown in Fig 2, the margin for insuring positive tripping is greater at lower temperatures, provided the battery functions properly.

Mechanism retrieving springs and breaker accelerating spring were measured, and then checked in relaxation at their final length after exposure for one week at -70F. The static strength actually gained at the lower temperatures. To test accelerating springs under operating conditions, a box was prepared and mounted around the breaker tail pipe which houses the spring. The box was insulated, packed with dry ice and allowed to stand overnight.

Breaker closing, tripping, and reclosing were performed with the surface of the accelerating spring housing at -112F. These tests were repeated when the tail pipe had warmed to room temperature. With the dry ice, the tripping time was found to be slightly faster and closing time slightly slower than at room temperature. The spring was found to be actually stronger at the low temperatures. Increased strength helps to offset sluggish operation of cold lubrication.

Preformed wiring, micarta terminal blocks, and relay cases showed no detrimental internal stresses after a week at -70F.

Normally, oil circuit breakers are built to operate in ambient temperatures up to 104F with a permissible 54-deg rise. At extremely low temperatures, they can carry more current than is indicated on the breaker nameplate. This additional current can be helpful in preventing the formation of sleet on line conductors.



PLEXIGLASS SLEEVE over 138-kv duct-spliced cable joint allows cable crews to observe the effects of evacuation on the tape. Hole in sleeve end is slightly larger than cable diameter

Show Joint Evacuation with Plastic Sleeve

H. R. LA PORTE, Assistant Staff Engineer, Underground Distribution, Los Angeles Dept of Water & Power

A clear plastic sleeve placed over a normal spliced and taped cable joint effectively demonstrates to field crews the necessity for adhering to prescribed procedures for evacuating cable joints. This scheme originally was developed by Los Angeles Dept of Water & Power for use in their cable splicer's training program.

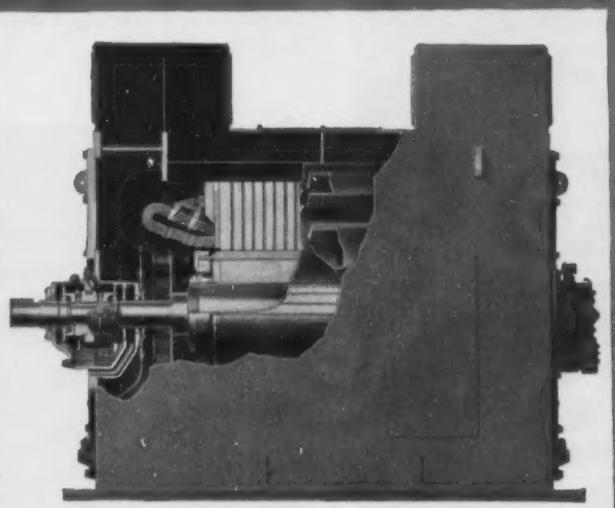
By use of the sleeve, splicers may be shown the suprisingly large amount of trapped air that may be drawn out of the tape. The department feels it can convince cable crews that a thorough job of evacuating cable sleeves is necessary.

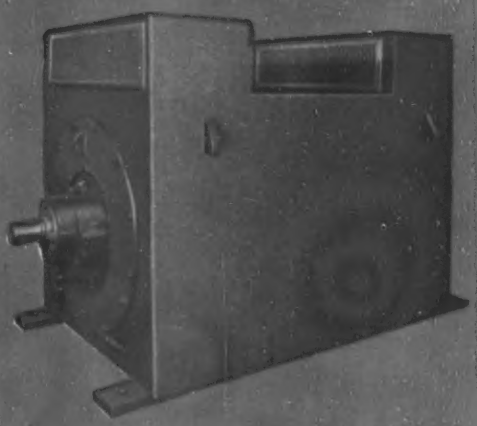
The plastic sleeve is designed for a 138-kv, lead-covered, single-conductor cable. It consists of two 6-in. diam plexiglass cylinders with a ¼-in. wall thickness fitted end to end. Two cylinders are used because the shorter lengths are easier to place over the taped joint.

Glued to the outer end of each cylinder is a reinforced plexiglass disk with a hole in the center about the diameter of the cable. Glued to the inner end of one cylinder is a plexiglass collar that is threaded to take the

Redesigned

INSIDE AND OUT





ALLIS-CHALMERS Boiler-Feed Pump MOTORS

New features improve 2-pole motors long known for reliability and low maintenance.

New ventilating arrangement features top air intake and discharge *plus* spiral stator core ventilation. Top intakes (available with filters) keep motor clean and make motor room cleaning easy; top discharge adds to personnel comfort. Spiral ventilation — used in turbine generators — assures even internal cooling . . . combines with centrifugal fans and baffled air passages to reduce noise.

Improved bearing design simplifies maintenance, prevents oil leakage. Capsule-type housings — proved in use on other designs — permit inspection of windings without exposing bearings. Oil leakage is prevented by a combination of features, including orifice-metered oil flow, weirs to maintain correct oil level, labyrinth seals, breathers, and annular pressure chambers with atmospheric relief.

Clean-cut appearance is gained by providing internal space for stator and auxiliary leads, etc.

Features that helped build the Allis-Chalmers 2-pole motor reputation for reliability are retained in the new design. These include proven stator coil design, ample stator coil end bracing, thermally and mechanically stable cage assembly, separate balancing rings, and oxygen-free dew-drop cage bars.

This design available in ratings 900 hp and larger. Ask your A-C representative for Bulletin 05R8123. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4350

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FOR SUREST CABLE PROTECTION

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BERMICO®

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With Bermico Lifetime Conduit you get the greatest possible protection for your cable—at low cost. That means fewer outages, uninterrupted service for your customers, and less expense for you.

Made from sturdy wood fibre, impregnated with pitch, Bermico is *completely uniform* from end to end. For the best protection for your cable specify Bermico. It's light, tight, strong, waterproof, acid-resistant, with smooth bore.

All Westinghouse Electric Supply Company offices are equipped to give you prompt, efficient service. They carry, for immediate shipment, large, well-balanced stocks of all sizes, together with fittings for any situations you may encounter in installing underground ducts.

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other cylinder. The accompanying illustration show how a special vacuum seal mastic and plastic tape are used to seal the sleeve to the cable. Plexiglass blocks are glued to the cylinders to provide sufficient threads for vacuum line connections.

Because the 6-in. diameter cylinders were the largest obtainable, less than the full amount of tape is applied to the demonstration joint. However, the department is planning another model with a larger sleeve so that evacuation of a fully taped splice may be demonstrated.

MOBILE WORK STAND facilitates transfer of Doble test set and accessories

Work Stand Provides Mobility for Test Set

A. WILSON, Engineer, Substation Dept, Indiana & Michigan Electric Co., Fort Wayne, Ind.

A mobile work stand for a Doble Type M test set serves as a combination test-set holder, work table, and storage cabinet. Considerable time is saved in making the set ready for test when using the stand.

Previous test equipment was bulky and required a truck to transport it. Loose accessories could be easily scattered or lost and cause confusion or delay. With the introduction of the Type M set, which weighs about 50 lb, and its installation on a stand, greater portability is provided. Handles and wheels aid transporting of the test set and accessories.

Enclosed portion below the test set contains a reel on which cables may be wound by a crank when not in use and also a drawer for small items including forms, paper, and pencils.

For heavy-duty arcing loads....

Specify ELKONITE® CONTACTS

- Good Conductivity
- Resistance to Sticking
- Resistance to Arc Erosion
- Impact Strength

Elkonite Contacts combine these characteristics in a way that can't be equalled...

Elkonite is the registered trade mark for a series of unique materials developed by Mallory, and manufactured from metal powders. The Elkonite process combines metals which will not alloy, producing new materials with properties often superior to their constituents.

Elkonite combines the arc-resistance of tungsten, molybdenum, or their carbides with the high current-carrying ability of copper or silver. Thus, Elkonite Contacts give excellent service under heavy-duty arcing loads where other materials would fail.

The secret of Elkonite superiority is the *technique by which the materials are combined.* Specifying an equivalent chemical composition will not assure the same physical properties. For dependable service in all heavy-duty circuit interrupting equipment, specify Mallory Elkonite Contacts. The Elkonite family of materials includes a variety of compositions for a wide range of contact requirements.

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Expect More . . . Get More
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Write for your copy today. It includes a discussion of Mallory materials and facilities for producing contacts and contact assemblies for every service . . . as well as valuable technical and design data.

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Fluorescent Lights...

. . . discussed in street lighting conference at General Electric Co

Some 200 electric utility and municipal representatives attended the annual street lighting conference of General Electric Co at Nela Park. GE turned on for the first time their new lighting system featuring 35 fluorescent luminaires for park-type roadways.

H. S. Nonneman, Dayton Power & Light Co, reported experience with a 52-luminaire fluorescent installation in Oakwood, Ohio (EW, June 29, 1953, page 122). He said that fluorescent street lighting has greater appeal to the public than mercury and incandescent. After more than 18 months, only four tubes have been replaced. Cost of operation and maintenance was $461.54 (about $9 per fixture), of which $310 was for washing.

According to Kirk M. Reid (GE), fluorescent has a long way to go. Of present sockets and lumens, filament lamps account for 96 and 87% respectively, mercury for 2.5 and 12%, sodium for 0.5 and 1.0%, and fluorescent for only 0.5 and 0.5%.

Photo Control . . . J. D. Blythe, Indianapolis Power & Light Co, pointed out that the trend to higher primary distribution voltages raises a problem of carrying series circuits on present crossarms and poles. Photoelectric control eliminates the need for such conductors.

A paper by F. H. Linsley, Connecticut Power & Light Co, reported on 5-years experience with photo control. This company has some 16,000 street lights individually controlled.

Ballastless Mercury Cheaper . . . General Electric representatives from the Lynn Works displayed and described their 3.2-amp constant-current transformer for mercury lamps without ballasts on series circuits.

H. G. Hrivnatz, Houston Lighting & Power Co, reported on their circuit of this type that went into service last February. Their experience indicates an investment cost about 18% less for the ballastless mercury, and an operating cost about 8% less.

2.5-Million Btu Electric Water Heater

Electric water heater, believed to be the world's largest, was built by Wesix Electric Heater Co, San Francisco, Calif.

The 26 immersion-type elements are mounted in the two heads of the tank and connected in five individual circuits for control and flexibility. The heater is rated 754 kw, 480 v, 3-phase. It is designed to operate at 200 psi and 360F.

Scholarships Offered By 3 Manufacturers

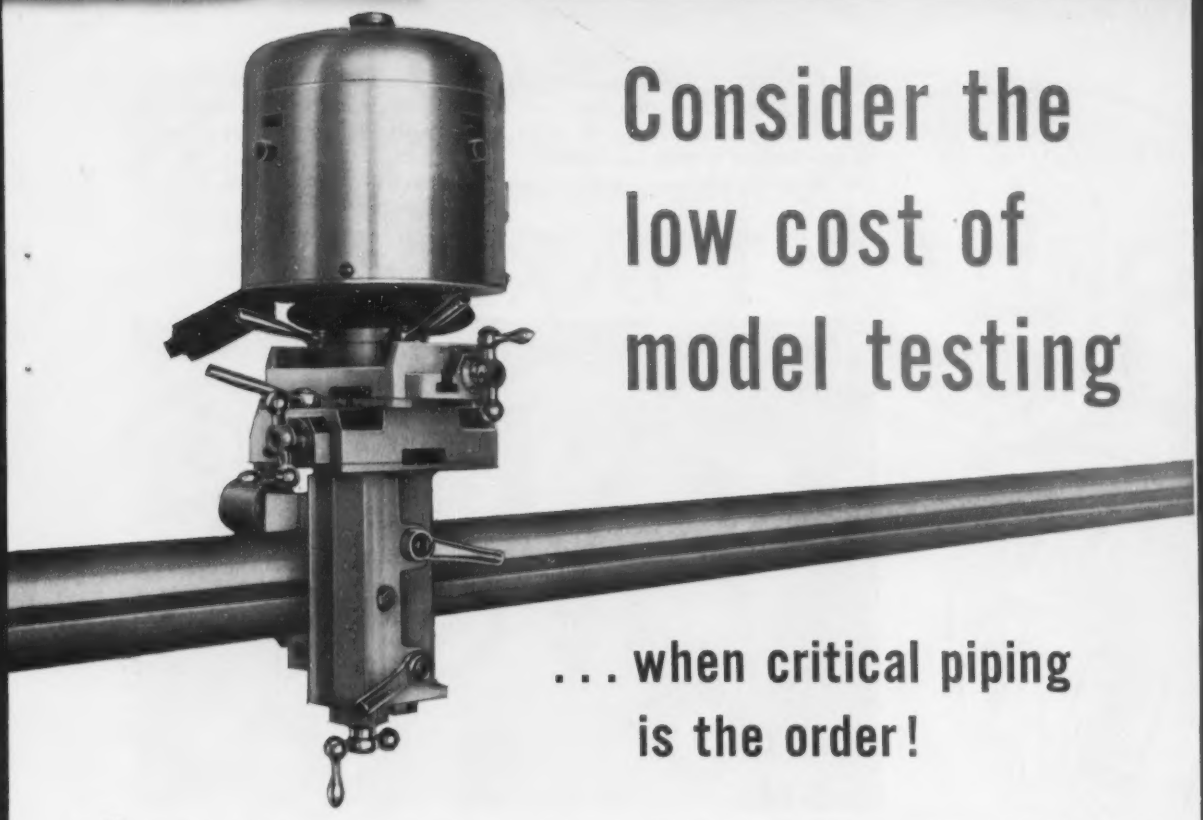
A scholarship program to assist students interested in the technical sciences has been announced by the Ohio Brass Foundation, a non-profit organization which was established by the Ohio Brass Co, Mansfield, Ohio. Scholarships will be awarded to students from the plant areas. They cover tuition, academic fees, and up to 50% of board and room, and will extend for a four or five year period.

An annual four-year scholarship for sons of employees of Electro Dynamic Motor Generator Division and Electric Boat Division of General Dynamics Corp, Bayonne, N. J. will be offered for the first time this fall by the corporation. Winner in a competitive examination will be awarded the scholarship leading to a bachelor of science degree in engineering or an allied field at the college of his choice. Coverage will be tuition and laboratory fees, including a sum for books and other college expenses.

A young employee and three teenage sons of Westinghouse Electric Corp employees have been awarded $2,000 "War Memorial Scholarships," enabling them to pursue studies in engineering or the physical sciences.

Worthington Reveals Place in Nuclear Power

Worthington Corporation's position in the field of nuclear power was revealed recently by R. H. Davis, manager of the Marine Division. After outlining some past activities, such as at Oak Ridge and on the submarine Nautilus, Davis said, "One of our present activities in nuclear power consists of the analysis of and design for the many hydraulic and fluid friction problems in an improved hermetically sealed canned motor primary coolant pump. Other projects involve stationary and portable nuclear power



Consider the low cost of model testing

. . . when critical piping is the order!

Mechanical engineers are quite familiar with the fact that today's high operating temperatures may produce severe expansion stresses and reactions in high temperature power piping systems. But the accurate determination of these by analytical methods can involve extremely complicated and tedious mathematics.

A proved means for eliminating much of the expense of this essential engineering is the Kellogg Model Tester. This device's patented electrical measuring heads (illustrated), together with its servo-operated electronic equipment, enable Kellogg engineers to make complete analyses of thermal effects including line movements . . . at low cost.

For very complicated piping systems, the model tester is the only practical method of obtaining accurate solutions. For simpler systems, it serves as a relatively inexpensive check on calculated results. Furthermore, once the permissible reactions are established for loadings at the throttle valve and the superheater header connections, the optimum design for the remainder of the system can be developed without removing the model from the tester. For analyses of less complicated piping systems, Kellogg engineers employ a modern IBM computer to reduce costs and time required to arrive at results.

Well-conceived support and anchor designs for the suspension and expansion control of all classes of lines are readily established from the information furnished by the model tester. It can also provide data to insure proper handling of the piping in the field, during welding and heat treating . . . minimizing strains, due to extraneous loadings, which might be detrimental to the production of soundly welded joints.

This approach to the problems of critical power piping—the development of new and improved methods, of less expensive methods—is Kellogg's basic stock in trade. Many power station designers and utility companies also say it's the basic reason why they repeatedly specify *"critical power piping by Kellogg."*

* * * *

NEW POWER PIPING BOOKLET . . . Send for descriptive literature about Kellogg's extensive facilities for assuring the highest quality workmanship.

These leading companies are among the many major producers of power who use M. W. KELLOGG POWER PIPING . . .

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- Houillers Du Lorraine (France)
- Houilleres Du Bassin Du Nord Et Du Pas-De-Calais (France)
- Hydro-Electric Power Commission of Ontario (Canada)
- Indiana & Michigan Electric Co.
- Long Island Lighting Co.

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DUXSEAL®
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quick and tight

DUXSEAL is a non-hardening adhesive plastic compound made with an asbestos base. It is the ideal general utility sealing and caulking compound for duct openings, potheads, bushings, terminal boxes, and for filling multi-wire contact boxes indoors. Use it like putty, just as it comes from the handy package, for smooth, workmanlike jobs.

Duxseal stays plastic—will not slump, melt or run under ordinary temperatures. Clings to duct walls and cables but flexes with expansion and contraction. It is unaffected by water and gases, does not react with rubber, metals or painted surfaces. For full information write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

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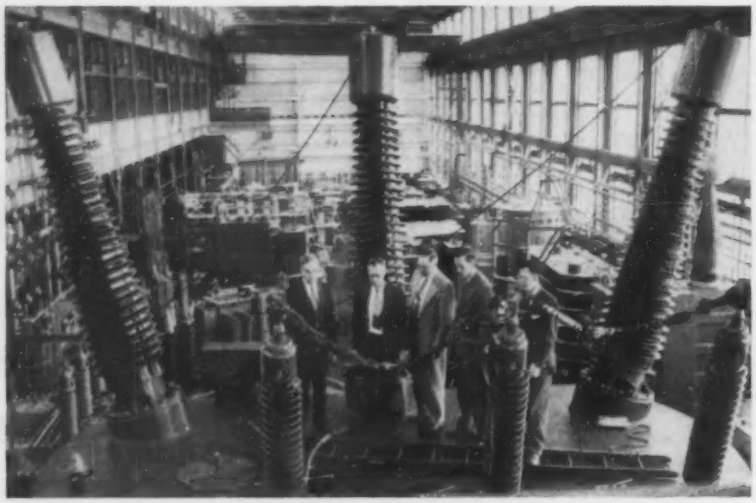
SEALING COMPOUNDS

plants. Much of this work is being carried on in close cooperation with other companies engaged in the effort to use nuclear energy for beneficial and peaceful purposes as early as possible.

"At the start," Davis said, "much lower steam pressures and temperatures will result from the use of nuclear power than is the present power plant practice; but pressures and temperatures will ultimately again turn upwards as nuclear power plants develop."



150,000-Kva Autotransformer for AEC

One of the largest high-voltage autotransformers in the U. S., shown on the impulse test floor at Allis-Chalmers Manufacturing Co in Milwaukee, was recently shipped to Sargents Station near Portsmouth, Ohio.

This 150,000-kva, 330/138-kv unit will deliver power to the Atomic Energy Commission's Portsmouth Area Project. It will interconnect 138-kv lines from Ohio Power Co and Columbus & Southern Ohio Electric Co with the project facilities. The 590,000-lb transformer was partially disassembled for shipment.

Ohio Power and Columbus & Southern Ohio Electric are part of the Ohio Valley Electric Corp, formed by 15 companies to supply power to the Portsmouth Area Project.

Water Systems Market

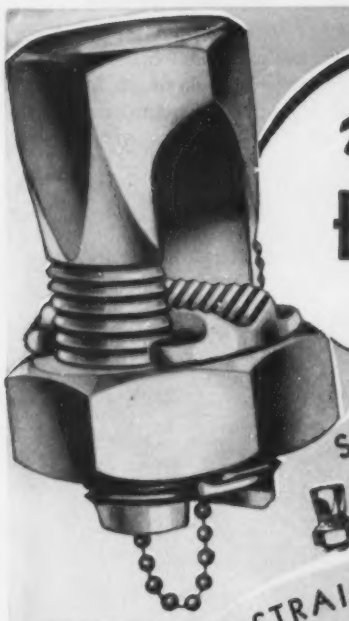
The market for electric farm pumps and water systems, and possibilities for wholesalers to aggressively develop this market, was the subject of a panel discussion at the spring meeting of the Central Supply Assn held in Chicago recently.

H. C. Angster of the farm pump manufacturers association called attention to the increase in sales of water systems. In 1953 sales passed 700,000. Walter F. Deming, Deming Co, Salem, Ohio declared that sales potential for 1954 is more than one million systems. Market categories include: public housing and construction of private homes, homes without piped running water, worn out or obsolete water systems, farms without running water, and second sources of water supply.

6% of Railroad Budget For Electrical Products

Nearly $125 million was spent in 1953 by Class I railroads for electrical products, according to data compiled by Association of American Railroads.

Wiring, switches, and motor and generator parts (including those for diesel locomotives) accounted for $55.5 million. Interlocking and signal material accounted for $52 million,



You can find the

EXACT FITTING

you need — in the

SERVICE CONNECTORS

STRAIGHT CONNECTORS

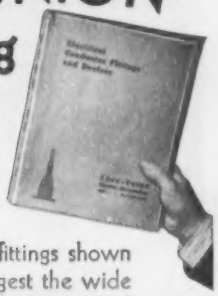
TEES

LUGS

GROUNDING CONNECTORS

and MANY MORE

PENN-UNION Catalog



The conductor fittings shown here can only suggest the wide variety. You'll find practically every good type, in a complete range of sizes.

New connectors are constantly being added - - so when you need a special fitting for an unusual service, tell us about it. Most likely we have exactly what you want.

Better design is a Penn-Union feature that you'll appreciate. For example, note the large gripping surfaces for wrenches, on the service connector shown in the upper left corner. When you use any Penn-Union fitting, you are sure that it is dependable - - mechanically and electrically.

Preferred by Leading Users, who have found that the "Penn-Union" mark on a connector is their best guarantee of unfailing service.

Sold by Leading Wholesalers

PENN-UNION ELECTRIC CORP.
ERIE, PA.

Canada: Dominion Cutout Company, Ltd., 250 Richmond St. West, Toronto

The COMPLETE Line of Conductor Fittings

PENN-UNION

A complete BATTERY CHARGING SUB-STATION

IN 1 UNIT

1954

- POWER COMPANY TESTED
- AUTOMATIC — OPERATES UNATTENDED
- ALL STATIC COMPONENTS
- NO MAINTENANCE REQUIRED

CHARACTERISTICS:

AC INPUT: 110 or 200 volts, 50 or 60 cycles, single phase. Also 220 or 440 volts, 50 or 60 cycles, three phase.

DC OUTPUT: 2 to 60 cells in ratings to 50 KW.

OUTPUT CONTROL: Automatic volts/cell float batteries at 2.15 volts and booster charge to 2.33 volts. Precise potentiometer adjustment on front panel.

VOLTAGE REGULATION: Less than 0.1% from no load to full load with ±10% A.C. supply line variation.

Time-tested through years of power company use, the INET Regulated Rectifier Battery Charger is a centralized unit for the automatic charging of unattended batteries. Complete assembly including controls, meters, rectifiers and distribution load centers are mounted in one complete unit for convenience and low-cost installation.

Dependable Performance—INET Battery Chargers combine the efficiency of long-life Selenium Rectifiers with the proven dependability of Magnetic Amplifier Controls for economical operation.

Maintenance-Free—Requires only routine inspection—unit has no moving parts or tubes. Automatic Overload Control maintains constant voltage output regardless of variations in A.C. line or load fluctuations. Units are available in panel, wall mounted or floor standing cabinets made of heavy gauge steel.

Write for literature and complete engineering specifications

INET DIVISION OF LEACH CORPORATION
4545 Santa Fe Avenue, Los Angeles 58, California
Phone: LOgan 9-4771

and $17.3 million went into telegraph, telephone, and radio material. Electrical materials accounted for more than 6% of the combined sum spent for all fuel, materials, and supplies used in daily operations, $1,920 million. Class I railroads in 1953 invested $1,260 million in capital for new and improved plant.

Reliance of Canada Ups Transformer Output

Expanded plant facilities of Reliance Electric and Engineering (Canada) Ltd, Welland, Ontario allow for increased production of its ELS core transformer. This distribution transformer, being produced in sizes up to 100 kva, uses oriented grain steel for increased efficiency and lighter weight. This steel only recently became available for export to Canada. The 100 kva models may be pole mounted. Details of the ELS core and coil assembly are illustrated.

MANUFACTURING BRIEFS

An 11,000-ton cargo of alumina left Port Esquivel, Jamaica in May (via Panama Canal) for Kitimat on the west coast of Canada. The alumina will be smelted at the $275-million hydro power and aluminum complex built in British Columbia by Aluminum Co of Canada, Ltd. The plant of Alumina Jamaica Ltd is being expanded to supply 20 or more boatloads of alumina a year for Kitimat and other users. Chemical extraction of alumina from raw bauxite in Jamaica gives 50% savings in ship-

His testing makes CHASE® Antimonial Admiralty Condenser Tubes the *best you can buy!*

TOUGH is the word for the Chase Expansion Test pictured above. A pin with a 1½" per ft. taper is driven into the end of a Chase Condenser Tube which must withstand an increase of *20% in diameter.*

This test is just one of many that Chase Tubes must pass.

Chase *ANTIMONIAL ADMIRALTY* Tubes must pass far sterner tests in the Chase Laboratories than they will ever encounter under normal tube usage. That's why they last for years in actual use. It pays to insist on Chase.

CHASE WAREHOUSE STOCKS: Los Angeles, New Orleans
Prompt Delivery from Cleveland and Waterbury Mills

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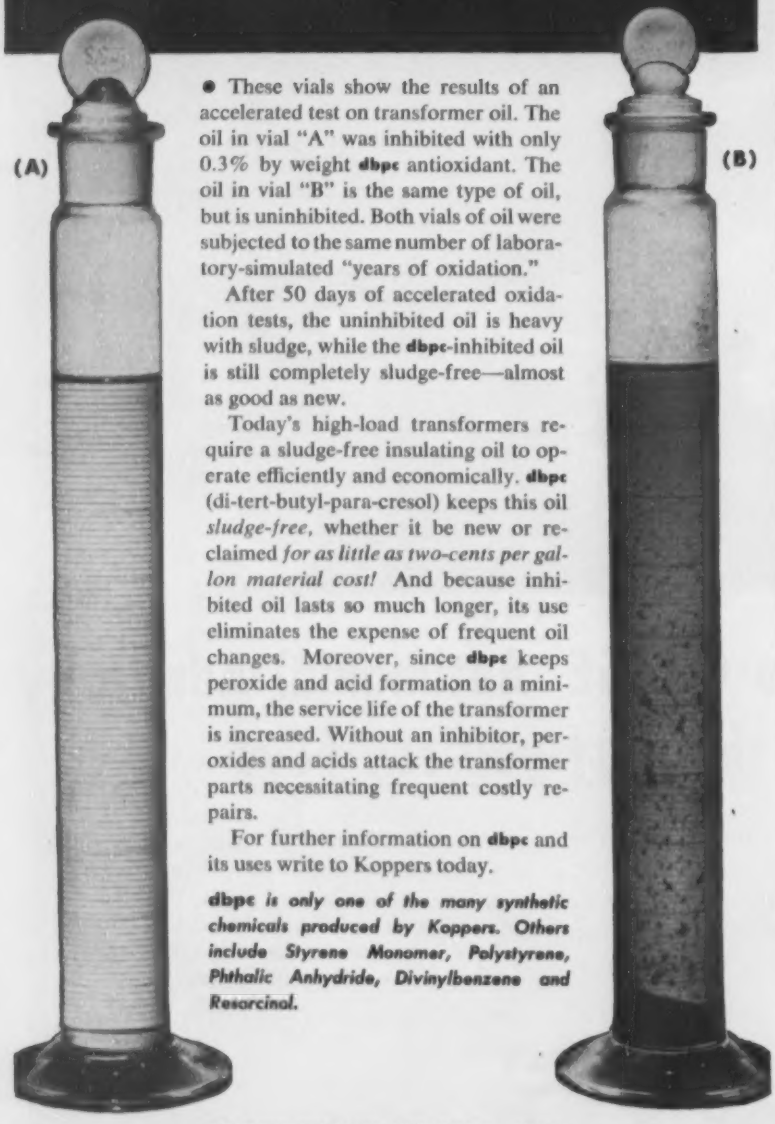
Baltimore	Cleveland	Houston	Milwaukee	New York	Rochester†	Waterbury
Boston	Dallas	Indianapolis	Minneapolis	Philadelphia	St. Louis	(†sales office only)

Accelerated Oxidation Tests Prove—

dbpc®-inhibited oil stays sludge-free



• These vials show the results of an accelerated test on transformer oil. The oil in vial "A" was inhibited with only 0.3% by weight **dbpc** antioxidant. The oil in vial "B" is the same type of oil, but is uninhibited. Both vials of oil were subjected to the same number of laboratory-simulated "years of oxidation."

After 50 days of accelerated oxidation tests, the uninhibited oil is heavy with sludge, while the **dbpc**-inhibited oil is still completely sludge-free—almost as good as new.

Today's high-load transformers require a sludge-free insulating oil to operate efficiently and economically. **dbpc** (di-tert-butyl-para-cresol) keeps this oil *sludge-free*, whether it be new or reclaimed *for as little as two-cents per gallon material cost!* And because inhibited oil lasts so much longer, its use eliminates the expense of frequent oil changes. Moreover, since **dbpc** keeps peroxide and acid formation to a minimum, the service life of the transformer is increased. Without an inhibitor, peroxides and acids attack the transformer parts necessitating frequent costly repairs.

For further information on **dbpc** and its uses write to Koppers today.

***dbpc** is only one of the many synthetic chemicals produced by Koppers. Others include Styrene Monomer, Polystyrene, Phthalic Anhydride, Divinylbenzene and Resorcinol.*

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Chemical Division, Dept. EW-6144 Pittsburgh 19, Pennsylvania

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ping. The SS Sun Karen, operated by Saquenay Terminals Ltd, has been converted for carrying bulk alumina.

Westinghouse Electric Corp Lamp Division plans construction of a warehouse in Evendale to serve the Cincinnati trading area. The warehouse will stock some 10 million bulbs and will serve southern Ohio, Kentucky, northern Tennessee, and southern Indiana.

SALES ASSIGNMENTS

COMPANY STAFFS

Federal Electric Products Co and its subsidiary, Pacific Electric Manufacturing Corp, has named R. L. Bobo manager of the new Great Lakes region, whose headquarters are located in Cleveland, Ohio. His territory comprises Michigan, Ohio, western New York, western Pennsylvania, Kentucky, and West Virginia. Prior to joining Federal-Pacific, he had been with Westinghouse Electric Corp since 1940.

Allis-Chalmers Manufacturing Co's General Machinery Division has placed M. M. York, formerly New England regional manager, in charge of its new Northwest region with headquarters in Chicago. This region includes Chicago, Milwaukee, Minneapolis, Duluth, Davenport, Des Moines, and Peoria and Rockford, Ill. J. H. Burrus, Jr, formerly Milwaukee district office manager, was named manager of the Midwest region to succeed O. V. Tally, new director of industrial sales. The latter region now consists of St. Louis, its headquarters, Indianapolis, Evansville, Louisville, Kansas City, Wichita, and Omaha, as well as the Memphis district. John E. Smet, formerly manager of the Hartford district office, was appointed manager of the New England region replacing York.

Graybar Electric Co, New York, has appointed B. P. Van Inwegen as manager at its district office in Baltimore. Van Inwegen, an electrical engineer, formerly was general power apparatus sales manager. He joined Graybar in 1934.

General Electric Co's Silicone Products Department has named Fred M. Pugh manager of its Midwestern Sales District. Pugh, who will be headquartered at Cleveland, has been a silicone products salesman working out of that office since early 1953. He started with GE in 1947.

REPRESENTATIVES

Electric Controller & Manufacturing Co, Cleveland, has appointed H. C. Guire & Co, 715 S. York St., Denver, Colo., as its sales agent for lifting magnets and motor controlling and starting equipment in Colorado, New Mexico, and Wyoming.

Pittsburgh (Pa.) Reflector Co has designated two representatives for its fluorescent and incandescent lighting equipment. They are: Wayne D. Close Co, located at 5904 Monsanta Drive, Houston, will cover southern Texas territory. From headquarters at 112 E. Broadway, Council Bluffs, Iowa, V. G. Christiansen Sales Co will cover Iowa, Nebraska and adjacent territories.

25% More CLAMPING FORCE!

Amazing CFC* Process Sets Impressive New Standards for Connector Performance

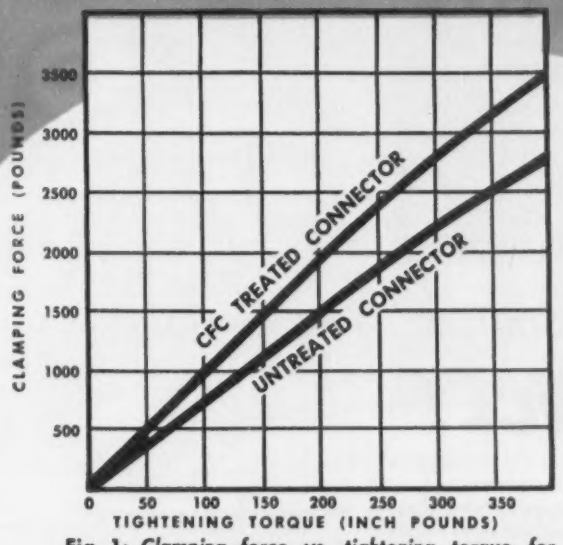


Fig. 1: *Clamping force vs. tightening torque for No. 2 stranded connectors, comparing CFC treated connectors with untreated connectors of the same lot.*

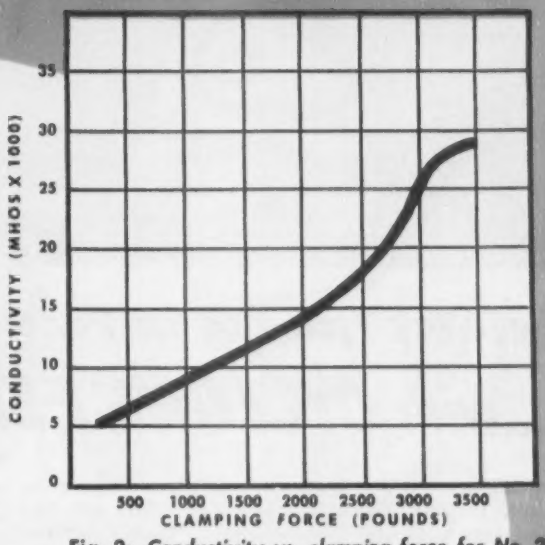


Fig. 2: *Conductivity vs. clamping force for No. 2 stranded hard drawn conductors.*

BLACKBURN'S exclusive chemical process for copper alloy connectors drastically reduces thread friction — increases clamping force — produces lower-resistance connections — and insures lasting, trouble-free service.

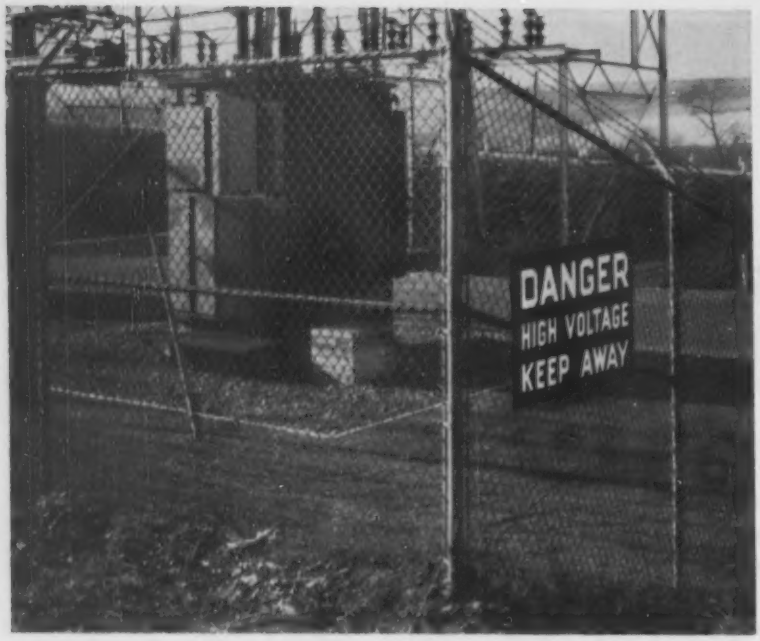
The above graphs show the great advantages of CFC treated Connectors. Note over 25% increase in clamping force. Note also how clamping force greatly increases conductivity of the connection. Thus, high clamping force, plus connector strength to **maintain** this force, gives you the **ideal** connection.

BLACKBURN Hi-Strength Connectors give you this **extra** clamping force — give you the **extra** strength to **hold** a maximum-pressure connection . . . Result — absolutely dependable connections that stay tight and trouble-free year after year.

**Chemical Friction Control Process — Patent pending*

JASPER BLACKBURN CORP.
35 MADISON ST., ST. LOUIS 6, MO.
Phone MA. 1-2821

BLACKBURN *Hi-Strength* CONNECTORS



Two-Way Protection for Power Stations ...with CYCLONE FENCE!

THERE are two very important reasons for good fencing around electrical power stations and substations... to protect valuable equipment and services from malicious vandalism and to guard possible trespassers from their own thoughtlessness. And one of the best ways to achieve this protection is with top-quality fencing...like Cyclone.

Cyclone Fence is extensively used wherever the maximum amount of protection and exclusion is required. In fact, today Cyclone Fence is famous as one of the most widely used property protection fences in the world.

You *can* buy cheaper fence than Cyclone, but it will cost you more in the long run. Cyclone gives full value for your dollar. Nothing but brand-new, top-quality material is used throughout. The chain link fabric is woven from heavy steel wire and galvanized after weaving for greatest resistance to rust. Erection is handled by full-time, well-trained experts. Cyclone's experienced engineers will be glad to give you more information and advice on your particular fencing problem.

NO JOB IS TOO LARGE—NO JOB IS TOO SMALL FOR CYCLONE*

CYCLONE FENCE DEPARTMENT, AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
WAUKEGAN, ILLINOIS • SALES OFFICES COAST TO COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Cyclone Fence, Dept. V-64, Waukegan, Ill.

Please send me without obligation, complete information on Cyclone Fence and Gates.

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Address.....

City.....State.....

Cyclone is the trade-mark name of fence made only by Cyclone. Accept no substitute.

USS CYCLONE FENCE

UNITED STATES STEEL

MEETINGS CALENDAR

American Society for Testing Materials
57th Annual Meeting, Hotels Sherman and Morrison, Chicago, June 13-18.

American Society of Engineering Education
62nd Annual Meeting, University of Illinois, Urbana, Ill., June 14-18.

Illuminating Engineering Society
Midwestern Regional Meeting, Hotel Jefferson, St. Louis, June 17-19; National Technical Conference, Chalfonte-Haddon Hall, Atlantic City, N. J., Sept. 12-16.

University of Michigan
International Mass Communications Conference on Nuclear Energy Developments, Ann Arbor, Mich., June 19-24.

American Society of Mechanical Engineers
Semi-Annual Meeting, William Penn Hotel, Pittsburgh, June 20-24; Fall Meeting, Schroeder Hotel, Milwaukee, Wis., Sept. 8-10.

Nuclear Engineering Conference
Sponsored by American Institute of Chemical Engineers, University of Michigan, Ann Arbor, Mich., June 20-26.

American Institute of Electrical Engineers
Summer General and Pacific General Meeting, Hotel Biltmore, Los Angeles, June 21-25; Committee on Petroleum, Conference on Electrical Applications in Petroleum Industry, Mayo Hotel, Tulsa, Okla., Sept. 27-29; Middle Eastern District Meeting, Abraham Lincoln Hotel, Reading, Pa., Oct. 5-7; Fall General Meeting, Morrison Hotel, Chicago, Oct. 11-15.

Canadian Electrical Association
Annual Convention, Murray Bay, Quebec, June 24-26.

Public Information Program
East North Central Region, Dearborn Inn, Dearborn, Mich., June 25; Workshop Conference, Chase Park Plaza Hotel, St. Louis, Oct. 28-29.

Michigan Electrical Association
Annual Convention, Grand Hotel, Mackinac Island, Mich., June 27-30.

Edison Electric Institute
Accident Prevention Committee, Mark Hopkins Hotel, San Francisco, July 1-3; Industrial Relations Committee, Round-Table Conference, Palmer House, Chicago, Sept. 27-29.

Northwest Electric Light & Power Association
Personnel Section with EEI Industrial Relations Committee, Multonah Hotel, Portland, Ore., July 12-14.

World Power Conference
Sectional Meeting, Rio de Janeiro, Brazil, July 25-Aug. 10.

Pan-American Federation of Engineering Societies
(UPADI), Third Convention, Sao Paulo, Brazil, Aug. 2-12.

Public Utilities Association of Virginia
36th Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va., Sept. 16-18.

National Electronics Conference
10th Annual Conference, Hotel Sherman, Chicago, Oct. 4-6.

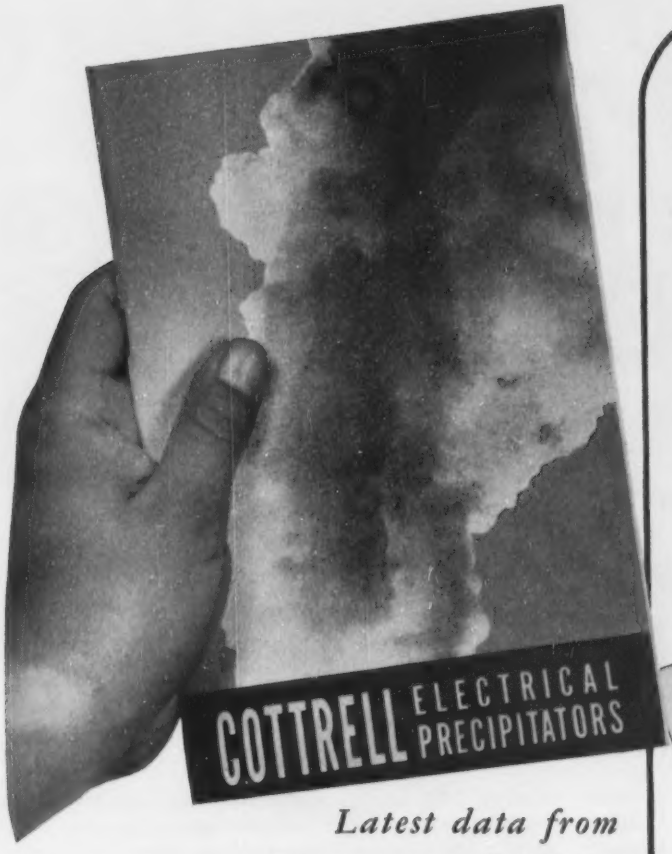
National Association of Electrical Distributors
Pacific Zone Convention, Mark Hopkins Hotel, San Francisco, Oct. 4-7.

Indiana Electric Association
Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 6-8.

Interstate Power Club
Meetings will be held at Hotel Martinique, New York, on following dates: Oct. 11, Dec. 6.

***National Electrical Manufacturers Association**
Haddon Hall Hotel, Atlantic City, N. J., Nov. 8-11.

*Addition this week.



40 PAGES of helpful information

on Recovering Dusts, Fly Ash, Mists, Fumes and other Suspensions from Gases.

This booklet summarizes

the important points design and plant engineers should know about Cottrell Precipitators . . .

- Basic types of Cottrell equipment.
- Principal elements in a Cottrell unit.
- Data on Mechanical and Electronic Rectifiers.
- Various types of Collecting Electrodes (rod curtains, corrugated plates, pocket electrodes, etc.).
- Typical ways of removing collected material.
- Various Shell Constructions (steel, concrete, brick, etc.).
- The effect of various factors on efficiency and performance.
- Data on CMP (Combination Multiclone-Precipitator) Units..

. . . and many other helpful facts on Cottrell design and operation.

Latest data from Western Precipitation on Cottrell Recovery Equipment

Do you have operations in your plant where gas-laden suspensions, wet or dry, are a problem? Such suspensions may be dropping on surrounding property, causing nuisance difficulties. Or perhaps important values are being lost in stack gases that can be profitably recovered. Whatever the nature of your recovery requirements, you will find this 40-page Cottrell booklet of great help. It contains up-to-date data on the latest advancements in the electrical precipitation field – prepared by the organization that pioneered the commercial application of Cottrell Electrical Precipitators almost a half century ago and has consistently led in new Cottrell developments.

A copy of this data-packed booklet will be sent free to engineers and other executives interested in recovery processes. Send your request to our nearest office.

For nearly 50 years Western Precipitation has carried on a continuous research and development program on Cottrell Electrical Precipitators, Multiclone Mechanical Collectors and other types of recovery equipment. We are not affiliated with any other company in the electrical precipitation field except our wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. We are equipped to serve you anywhere in the United States, Canada, and throughout the world!

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DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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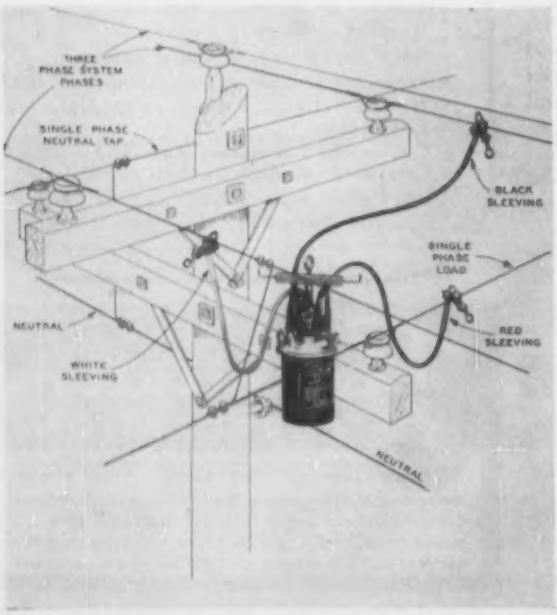
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

Giant Data-Processing Brain

Electronic data processing machine, Type 702, is usable for accounting and statistical work in large offices. Machine can reportedly prepare 100 utility bills a minute. Unitized construction simplifies installation and maintenance and allows assembly of units to meet customer's requirements. Units are interconnected by cables. The "702" will be available early in 1955 on a rental basis.

Arithmetical and logical unit performs calculations and makes decisions according to instructions stored in CRT memory. CRT memory also contains data being processed. Magnetic drums provide additional storage capacity. Data are read and recorded by magnetic tape units. Card reader introduces data into system from punchcards. Line printer, at 150 lines a minute, and card punch operate from the arithmetical and logical unit. Operator's control console maintains overall supervision.

International Business Machines Corp, 590 Madison Ave, New York 22, N. Y.



Load Transfer Switch

Manually operated load transfer switch, Type M, is rated at 100 amp, 5 kv line-to-line, for switching line-to-line loads. For switching line-to-neutral loads, rating is 8.66 kv line-to-line.

It is a spdt unit having three integrally connected phase leads 8.5 ft long and terminated by hot-line clamps. Mechanism is housed in an oil-filled tank. Tank head has an insulated hanger for hot-line clamps. Tank has an adjustable bracket for crossarm mounting.

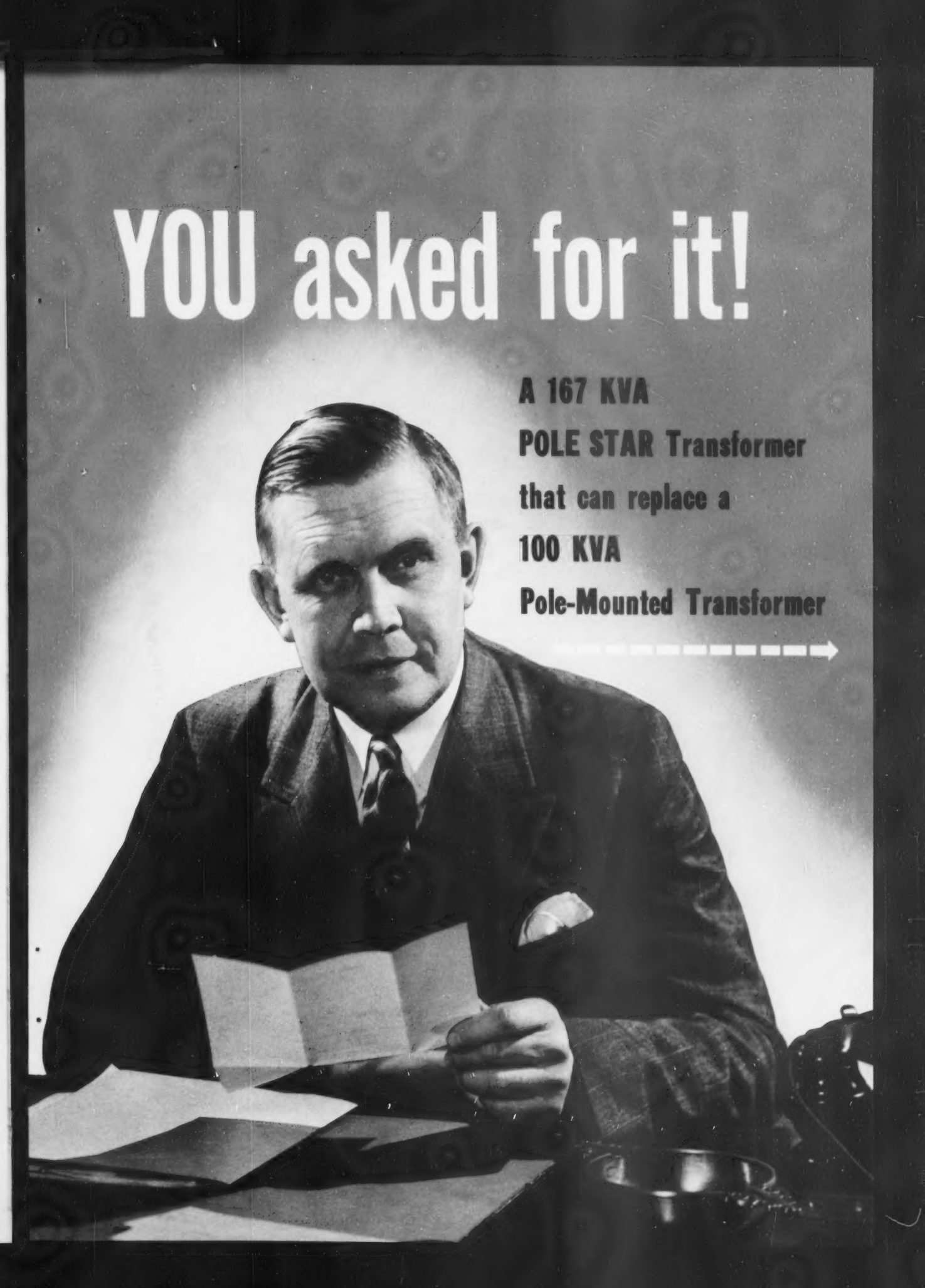
Complete unit measures 31 in. overall. Weight, including oil, is 37 lb. Unit has a 25-kv dry withstand for one minute at power frequency.

Line Material Co, 700 W. Michigan St, Milwaukee 1, Wis.

(*More New Equipment on page* 167)

YOU asked for it!

A 167 KVA
POLE STAR Transformer
that can replace a
100 KVA
Pole-Mounted Transformer



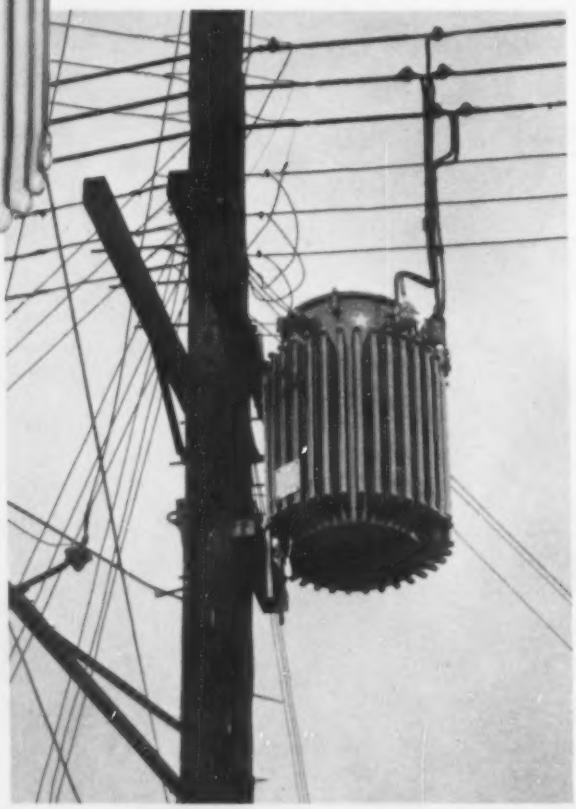
Pennsylvania Transformer Company

Introduces the New 167 KVA *Featherweight*.....

- ★ **Will replace any single phase 75 or 100 Kva Pole-mounted Transformer to provide 67% to 123% more capacity**
- ★ **Weighs less than 1500 pounds**
- ★ **Lower in overall height than average 100 Kva transformer**
- ★ **Available in standard voltages up through 13,200 volts**
- ★ **The FIRST 167 Kva transformer made for direct pole mounting**

AVOID THESE AND OTHER EXPENSIVE ALTERNATE MEASURES BY INSTALLING 167 KVA FEATHERWEIGHT POLE STARS

1 **Heavier poles** (if permitted by local ordinances) which would be required in order to carry heavier transformers.
2 **Double poles** for platform mounting of transformers.
3 **Underground systems** which involve expensive subway or vault-type installations.



167 Kva Featherweight Pole Star installed to relieve power shortage in congested business neighborhood. New "featherweight" transformer replaced 100 Kva unit to provide ⅔ additional capacity.

...POLE STAR TRANSFORMER

Utility Engineers asked for this Transformer

The continuing increased demand for more power is presenting a problem to utility companies serving crowded urban areas. Many power companies with distribution lines located in congested neighborhoods prefer to supply this load through larger-rated pole-mounted transformers rather than resort to more expensive measures, such as underground installations, additional poles for platform mounting, etc.

However, many utility poles in use today are designed to carry a *maximum* of 1500 pounds of transformers. The average weight of all present-day 100 Kva cold-rolled steel transformers — and yesterday's 75 Kva hot-rolled steel transformers — is approximately 1450 pounds. Therefore, 100 Kva is the largest pole-mounted transformer that these poles can carry.

Pennsylvania engineers were advised of this problem and were asked to design a 167 Kva transformer (*the next standard size after 100 Kva*) that weighs less than 1500 pounds. *And that's what Pennsylvania did!* Its answer to this problem is the new 167 Kva featherweight Pole Star.

Mechanical Characteristics

Weighs less than 1500 pounds.

Conforms to EEI-NEMA Fifth Report except for additional brackets for direct pole mounting.

Overall floor space slightly larger than average for 100 Kva transformers.

Overall height approximately 8″ less than industry average for 100 Kva transformers.

Electrical Characteristics

Regulation — Regulation in the new 167 Kva featherweight design compares favorably with that of the regular 167 Kva Pole Star.

Losses — The "featherweight" Pole Star is more efficient up to 60% loading and slightly less efficient above 60% loading.

Exciting Current — Low exciting current found in all Pole Star designs are also inherent in the 167 Kva featherweight design.

For further information on Pennsylvania's new 167 Kva Featherweight Pole Star, write, phone or wire your nearest Pennsylvania Sales Representative, or contact

DISTRIBUTION SALES DEPARTMENT

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **Box 330 CANONSBURG, PENNSYLVANIA**

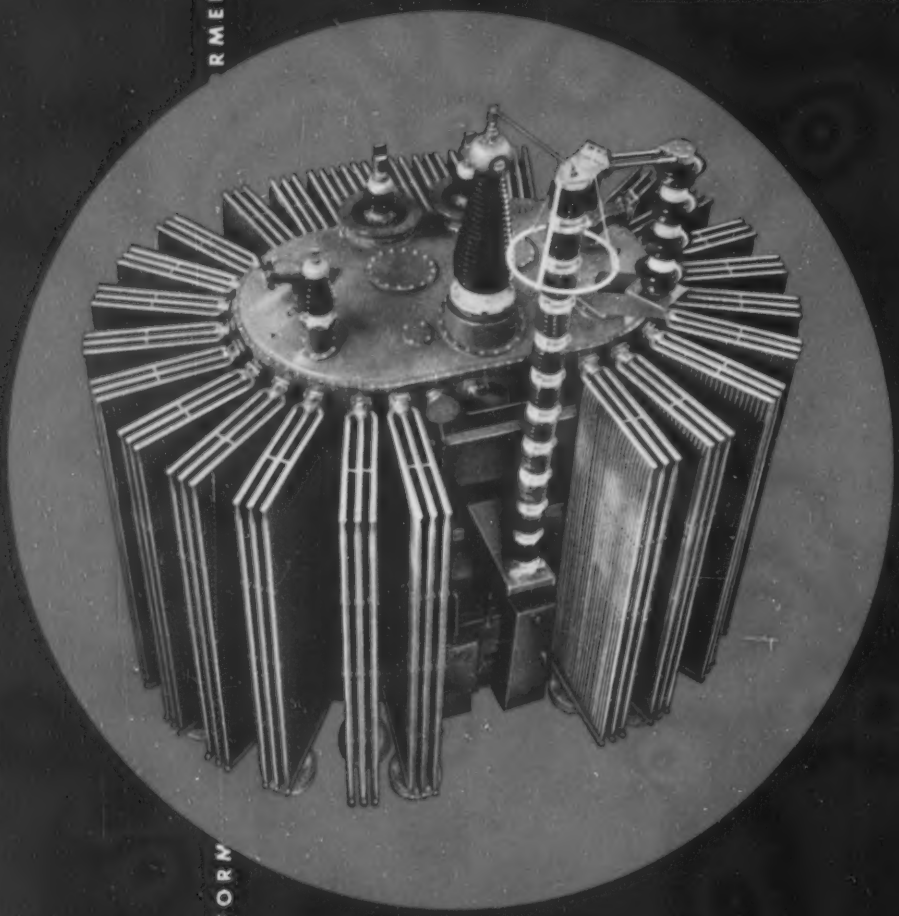
Phone: CANONSBURG 2380

PENNSYLVANIA POWER TRANSFORMER PENNSYLVANIA POW

70,000 kva

SINGLE PHASE

Pennsylvania Power Transformer



In addition to its forced-air rating of 70,000 Kva, this Pennsylvania transformer has a self-cooled rating of 56,000 Kva. Three of these transformers are connected in a 210,000 Kva bank to step up the generator voltage of 19,000 volts to the transmission voltage of 161,000 volts. The transformers were shipped to their destination in an upright position, completely assembled except for bushings and detachable radiators.

pt

Pennsylvania Transformer Company

A McGRAW ELECTRIC COMPANY DIVISION

CANONSBURG, PENNSYLVANIA

Greater Pittsburgh District

Stirrup Clamp

One-piece hotline stirrup clamp, Type AHLS, speeds installation and provides for positive tightening with a hot stick. Clamp body, cap, and eye are high-strength, heat-treated cast aluminum alloy.

Copper stirrup loops are serrated and compression-bonded into the clamps. Bolts have both flat and split washers. Hinge pins are stainless steel; other hardware is alumilite-finished high-strength aluminum alloy. Clamp has large contact area and reportedly eliminates arcing damage to conductors.

Anderson Brass Works, Inc, 700 N. 41 St, Birmingham, Ala.

Drinking Fountain

Portable drinking fountain holds 4 gal of water. An automatic air-pressure principle causes water to flow at touch of a button. Insulation keeps water cool. Shoulder strap, spill cup, and salt-tablet dispenser are optional.

Mink-Dayton, Inc, 117 N. Findlay St, Dayton 3, Ohio

Crack Detector

Magnetic-particle test unit locates surface defects in rough castings, bar stock, forgings, and shop welds. Objects to be checked are magnetized by passing current through the metal or through a surrounding coil. Magnetic iron oxide or precipitated iron powder is distributed over the surface of magnetized object—alignment pattern of the particles shows location of defects.

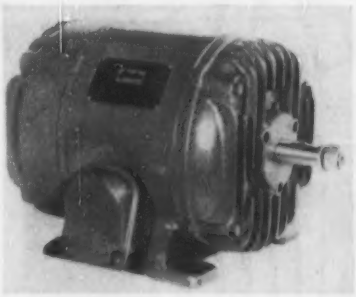
Two oil-resistant cables with renewable prods carry up to 600 amp at 1.5 v. For the wrap-around coil method, a coupler connects prods together. Panel meter reads 0-600 amp. A 6-v extension lamp has a magnetized base. Input is 110-v, single-phase. The Portaflux weighs 45 lb, measures 18 x 12 x 7 in.

North American Philips Co, Inc, 750 S. Fulton Ave, Mount Vernon, N. Y.

Silicone-Rubber Gasketing

Two compounds, SE-370 and SE-380, have been added to GE's Class 300 silicone rubber compounds. Similar to SE-360 but harder, these compounds are stiffer for sealing and gasketing involving high pressures and up to 500F. Shrinkage is less than other silicones—molds designed for organic rubber may often be used. Moisture absorption is said to be less than 1% after continued immersion in boiling water.

General Electric Co, 1 Plastics Ave, Pittsfield, Mass.



Loom Motors

Totally enclosed, non-ventilated motors are rated ¾, 1, 1½, and 2 hp; 1,800 or 1,200 rpm; and 2 or 3 phase. Oversize bearings with special grease reportedly give longer life. Finned

You can be sure it's

DEPENDABLE

It's a

Richardson Allen

A New Automatic Charger For Floating Service

- Full-wave charger, self-regulating, reactor controlled,
- Maintains correct voltage within ±1% under any charger load condition,
- Compensates for an A-C variation of ±5%,
- Sharp overload voltage drop,
- Dependable SELENIUM CELLS,
- No vacuum tubes,
- High-gain magnetic amplifiers,
- Inbuilt resistance to all types of corrosion,
- Many sizes available; special designs to order.

Write for descriptive circular

RICHARDSON-ALLEN CORPORATION

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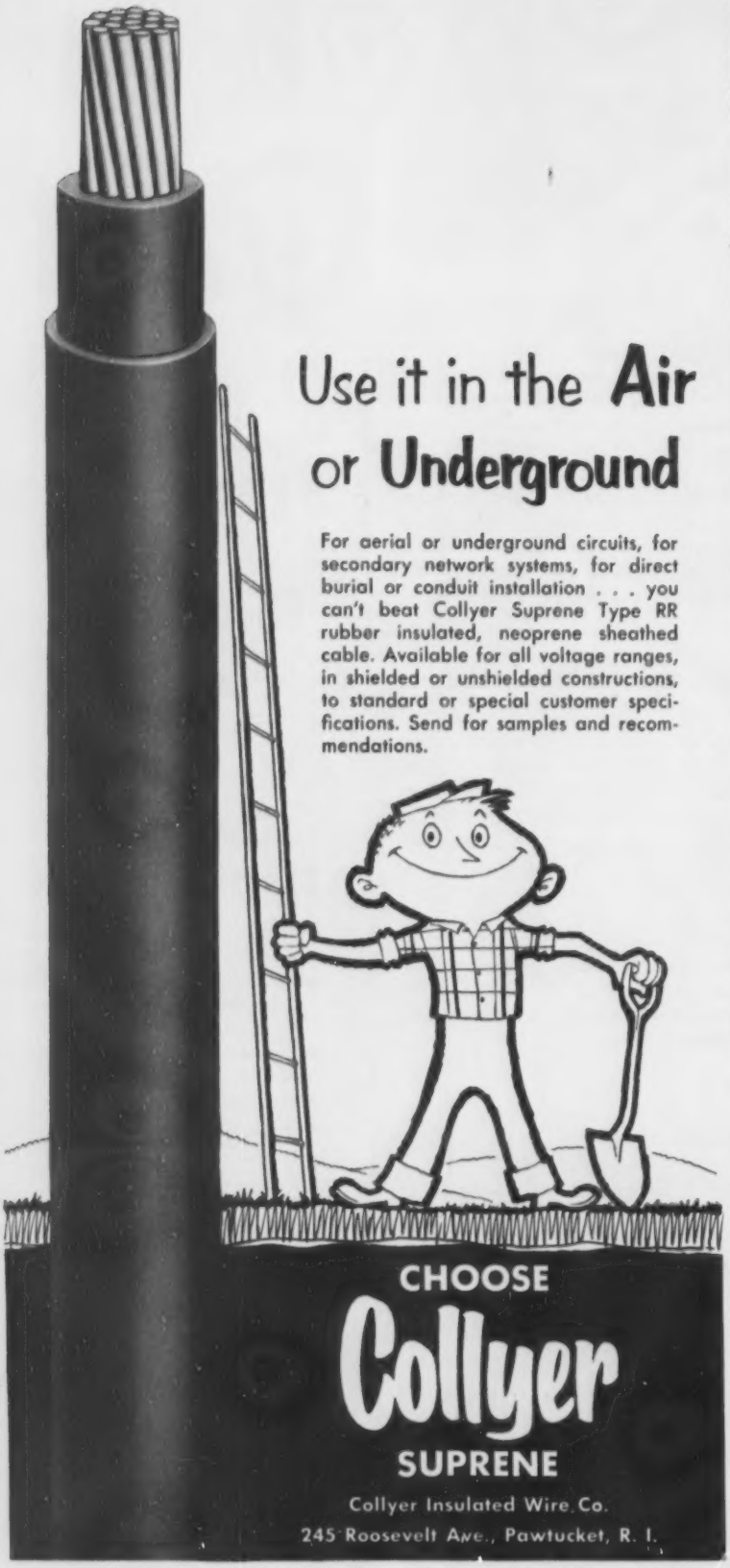
Wesley Block & Co., Inc.

39-15 Main St., Flushing, N. Y.

In Canada: Richardson-Allen of Canada, Ltd., 370 Victoria St., Toronto, Ont.


Use it in the Air
or Underground
For aerial or underground circuits, for secondary network systems, for direct burial or conduit installation . . . you can't beat Collyer Suprene Type RR rubber insulated, neoprene sheathed cable. Available for all voltage ranges, in shielded or unshielded constructions, to standard or special customer specifications. Send for samples and recommendations.
CHOOSE
Collyer
SUPRENE
Collyer Insulated Wire Co.
245 Roosevelt Ave., Pawtucket, R. I.

construction of cast-iron end-brackets increases strength and reduces temperature. Heavy-duty rotor with shrunk-fit flywheel provides inertia to smooth out fluctuating loom loads. Motors have foot or 3-point suspension mounting, and conduit box or multi-conductor squeeze connector.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Current Transformers

Miniature butyl-molded current transformers, Type JCA-O, are rated 200:5 or 400:5 amp, 600 v or less. It can be used on either single-phase 2-wire or polyphase circuits. ASA accuracy is: 200, 400 amp, 60 cps, Burden B-0.1 and B-0.2 Accuracy Class 0.3.

The molded-butyl casing serves as insulation and support. Transformer may be mounted indoors or outdoors, in a small box, on any flat surface, or suspended by its primary terminals. Weight of window type is 2¼-2½ lb; bar-primary type weighs 3½-5 lb.
General Electric Co, 1 River Rd, Schenectady 5, N. Y.

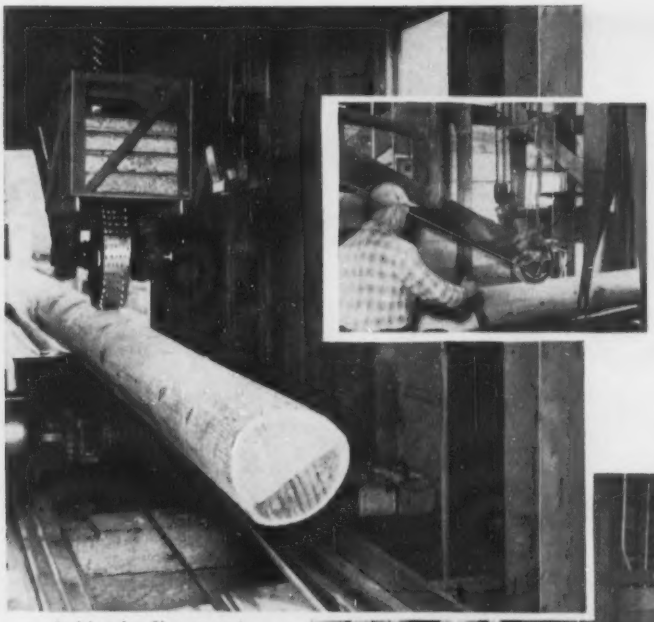
A-Frame Storage Kit

Derrick-storage kit fits standard utility truck bodies with derricks and enables operator in truck cab to erect or store the derrick. Operation up or down takes one minute. The system allows use of body space for other items. Kit bolts to rear of truck.
Tel-E-Lect Products Inc, 10,001 Minnetonka Blvd, Minneapolis 16, Minn.

Polyester Tapes

Mylar tapes are slit on a custom basis from clear or coated Mylar into almost any width and packaged to

(*Continued on page* 172)



Incising by fiber-spreading process in standard ground line area or any area required — including full length of pole.

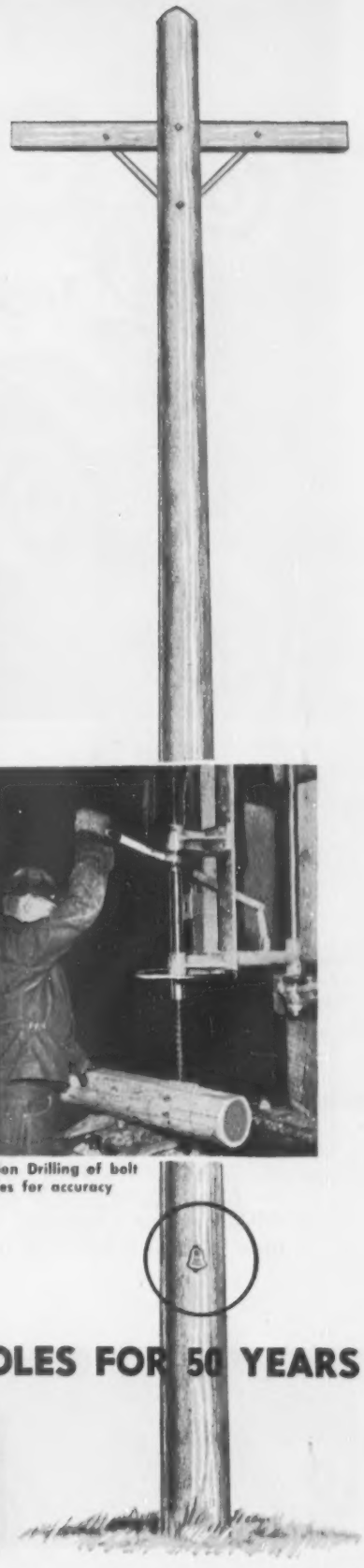
Slab gaining by machine any length gain or gains.

Precision Drilling of bolt holes for accuracy

From Bell's own Northwest timber areas are cut only selected HIGH ALTITUDE long span Western Red Cedar as well as durable Douglas Fir and Western Larch poles. All these western species contain within their heartwood natural toxic resins which resist wood destroying fungi.

In addition to controlled selection of pole timber, Bell's own yards and pole treating plants assure quality processed poles, precision milled to your specification.

Yes, for transmission, distribution or communication line use, Bell Poles are unsurpassed.



BELL

FINEST POLES FOR 50 YEARS

BELL LUMBER & POLE CO.

Minneapolis, Minn.

Will the Hi-Voltage Switches that you installed in 1934 withstand the short-circuit currents of TODAY? The answer is definitely "yes". Not only that, they will withstand the short-circuit currents of 1974. We cannot anticipate a short-circuit current great enough to "UNLOCK" a Hi-Voltage Switch.

WHY? There are two main reasons

1—Note in Figure 1 on the opposite page how short Dimension A is. If the leads to and from the switch were exactly in line with the switch blade, there would be no tendency for the blade to open under short circuit currents. However, for mechanical reasons, there must be a Dimension A, and if this dimension is increased, the force tending to open the switch increases. *Therefore, Hi-Voltage keeps Dimension A as small as possible and has for the past 30 years.* This is of particular importance when you consider that as the magnitude of a short-circuit current grows, its opening force increases as the square of the current. Doubling the current will produce four times the force, and so on.

2—The second main reason why a short-circuit current cannot "unlock" a Hi-Voltage Switch is the exclusive "IN-OUT-UP" action illustrated on the opposite page. Because of this action, the blade moves laterally into the sleet hood. The contacts are *positively* locked at the tip end. Of course, Hi-Voltage also employs the customary method of blocking the linkage at the hinge end.

When Hi-Voltage Switches are closed they stay "locked" until *you* want to open them.

HI-VOLTAGE

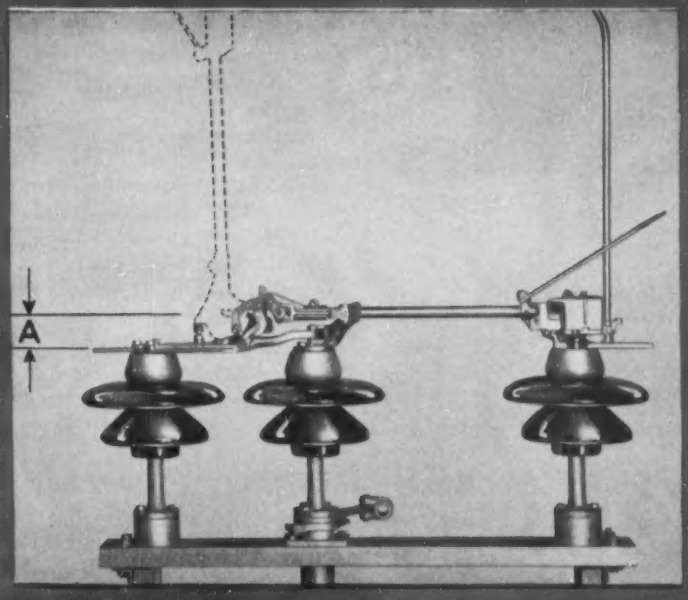


Figure 1—Dimension A is made as small as possible to minimize the hammering and heaving of short-circuit currents on contacts, blades and terminals.

Figure 2—Locking by blocking only the linkage of a switch seems somewhat like putting a lock on the hinge side of a door.

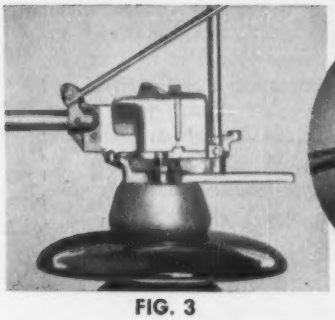


FIG. 3

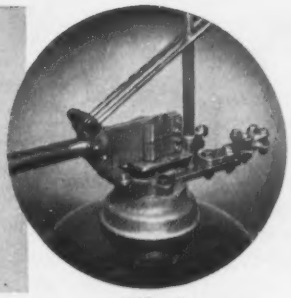


FIG. 4

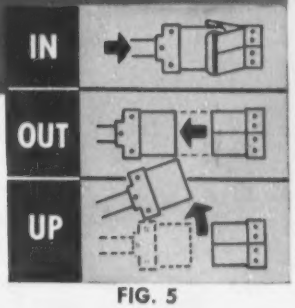


FIG. 5

OPERATING PRINCIPLE OF EXCLUSIVE "IN-OUT-UP" ACTION

(FIGURES 3, 4, 5)

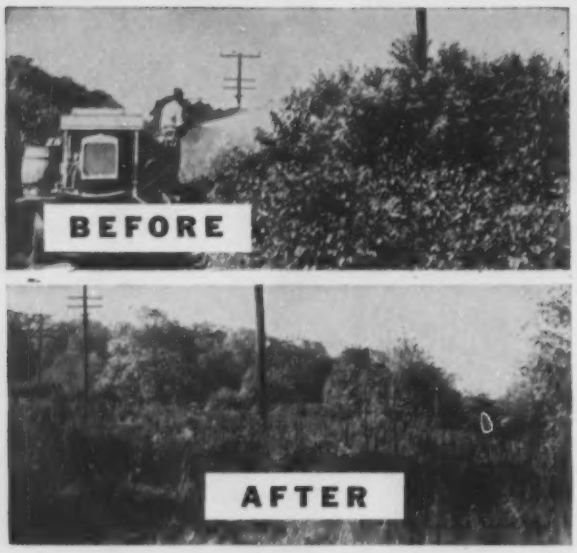
When closing, switch blade *pushes* directly and horizontally into the silver-inlay contacts. When opening, switch blade *pulls* directly and horizontally from the silver-inlay contacts. Then, the switch blade is automatically lifted to the vertical position by the powerful operating mechanism. *There is no twisting or turning.* In Fig. 4, the sleet hood has been removed to show the contacts.

The EXCLUSIVE "IN-OUT-UP" action is just one of the many outstanding features of Hi-Voltage Switches. Ask your Joslyn Representative about:

SILVER positive-pressure contacts.
MONEL BALL BEARINGS that never require any lubrication.
DIRECT MECHANICAL operating mechanism.
LOWEST POSSIBLE installation costs.

HI-VOLTAGE EQUIPMENT COMPANY

4000 EAST 116TH STREET • CLEVELAND 5, OHIO



How to Keep Brush Down for Years!

Use Du Pont AMMATE® Weed & Brush Killer—Has Minimum Drift Hazard

Controls Brush but Lets Grass Come Back Quickly to Resist Erosion

Industrial users of "Ammate" Weed and Brush Killer say that when the original spray job is done well, brush is kept under control with nothing more than an occasional spot spray years later.

Even where right-of-ways adjoin sensitive crops, like cotton, you can rely on "Ammate" to do the job safely. That's because it's not volatile—reducing spray-drift damage to a minimum.

This year, be sure to include "Ammate" in your brush-control program. It's ideal on power, telephone pipe-line and railroad right-of-ways—wherever you have a brush problem.

Free illustrated booklet describes how to control brush in right-of-ways with Du Pont "Ammate." For your copy, write Du Pont, Grasselli Chemicals Dept., D-4026, Wilmington, Delaware.

Ammate®

Weed and Bush Killer

DU PONT
REG. U. S. PAT. OFF.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

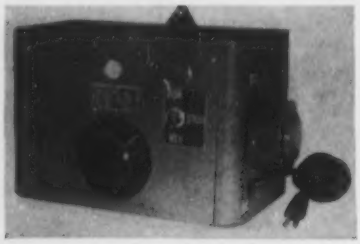
New Equipment

(*Continued from page* 168)

suit customers' serving equipment. Shock resistance and strength of Mylar allows higher speeds on serving machines.

Coatings can be applied to increase grip on wire or coil. Other coatings can increase slip to conform to irregular shapes. Color is often added for visibility and code identification. Mylar has high tensile and dielectric strength, and heat and shock resistance.

Dobeckmun Co, P O Box 6417, Cleveland 1, Ohio



Variable Speed Control

Line of variable voltage selenium rectifier units for single-phase, 50-60 cps input are rated ½ to 3 hp. Units for 3-phase input are rated ½ to 75 hp. A single manual knob controls speeds. Units have nominal dc outputs of 115, 230, 250, or 440 v.

American Rectifier Corp, 95 Lafayette St, New York 13, N. Y.

Heating Wire

Heating wire is rated 90C and can be used in dry-wall construction for radiant heating. Wire has nylon coating over thermoplastic insulation. For installations in ceilings, room or zone thermostats control temperature, which can be kept to within a 4 deg differential between floor and ceiling.

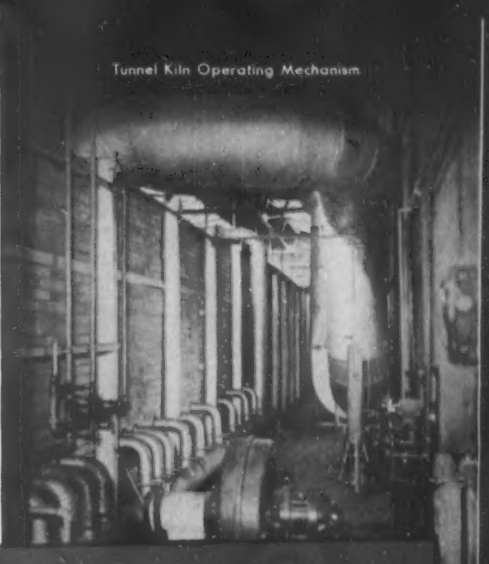
General Electric Co, 1285 Boston Ave, Bridgeport 2, Conn.

Booster Transformers

Boost- and buck-type transformers have two 120-v and two 12-v windings. A typical use is to run 230-v

(*Continued on page* 176)

Victor Tunnel Kiln No. 2—
(end and side view)



Tunnel Kiln Operating Mechanism

Another Reason Why—

VICTOR Makes Better Insulators

WE USE RECIRCULATING TUNNEL KILNS EXCLUSIVELY!

The firing process can literally make or break an insulator. By leaving nothing to chance, Victor "know-how" gives you the most perfectly fired high and low voltage insulators that money can buy.

Employing tunnel kilns exclusively, Victor research has done much to advance firing techniques. The use of re-circulation of heat to attain accurate, even temperature control, the use of optical pyrometers to measure tunnel kiln temperatures, automatic control instruments and silicon carbide kiln furniture are examples.

No wonder Victor *Purified* Porcelain Insulators are harder, denser, have more impact resistance, last longer and ultimately cost less! For the full story, send for our free booklet, "The Story of Victor and Purified Porcelain." Tells how research made possible this great insulator advance.

VICTOR NO. 245-R
(EEI-NEMA Class 56-3)
TRANSMISSION PINTYPE

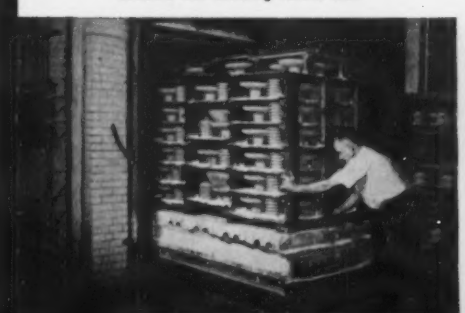
Specify

VICTOR PURIFIED PORCELAIN INSULATORS!

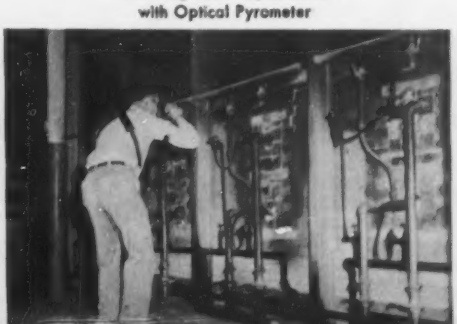
VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators
• Custom Designed Porcelain • Insulator Hardware

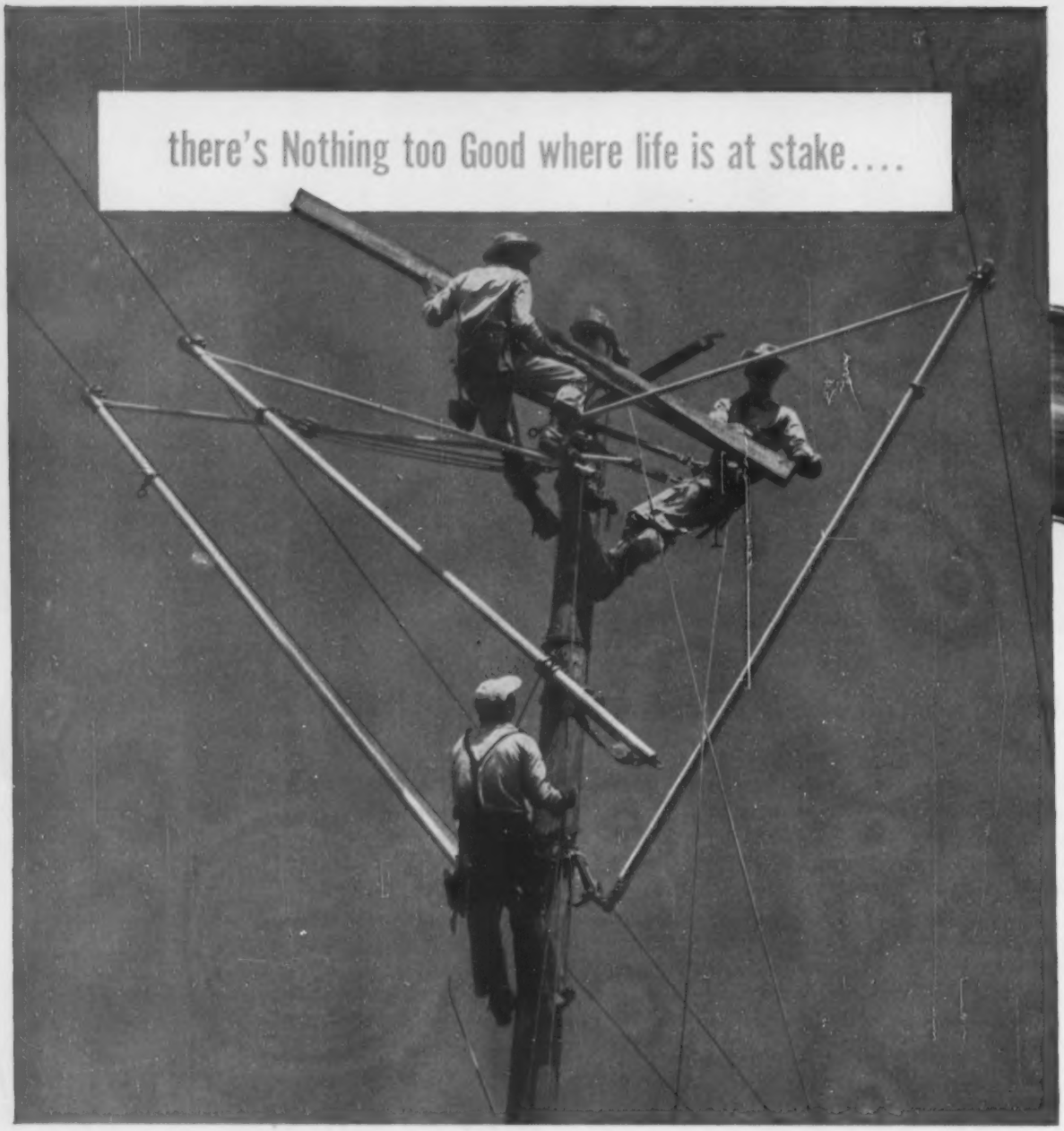
Loaded Car Entering Tunnel Kiln



Checking Kiln Temperatures
with Optical Pyrometer



Tunnel Kiln Control Panel



There's nothing more important to hot stick crews than the safety of the tools they use. It's also important to safety directors, maintenance supervisors and, of course, to management that these tools be absolutely safe, that they are properly cared for and carefully inspected at periodic intervals.

Plastic coatings have helped to make hot sticks safer by protecting them from external damage. Chance "Maplac," a tough transparent plastic protection also makes it possible to check the condition of the wood by visual inspection.

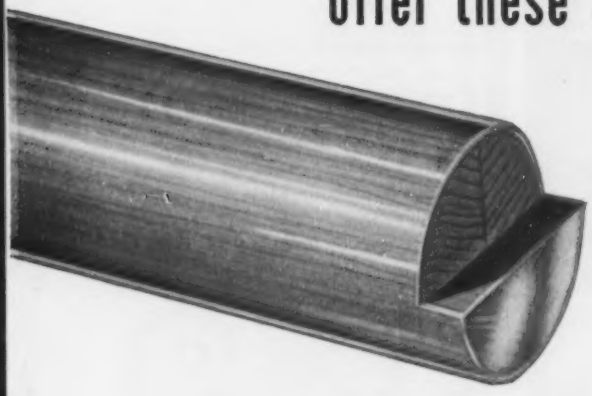
Five years of tests and research preceded the introduction of "Maplac". Now Chance Plastic Protected Tools have been on the job for two and a half years, proving in actual field use that "Maplac" fully meets the long-established Chance standards for excellence in performance and *safety to linemen.*

abc INDUSTRIES

Give the man on the pole a CHANCE for safety

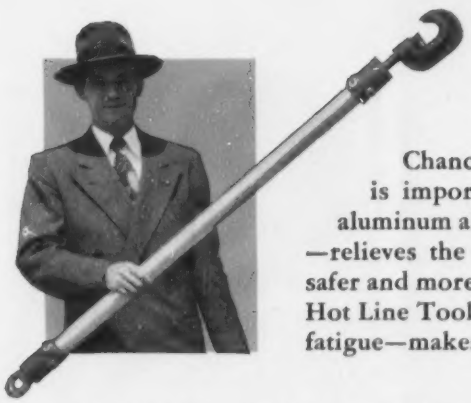
CHANCE *MAPLAC** HOT LINE TOOLS

offer these 3 Important Advantages!



1.*PLASTIC PROTECTION

The poles used on all Chance Hot Line Tools are completely sealed and protected with a super-tough, crystal-clear plastic finish that resists surface abrasion—is unaffected by oil, grease, gasoline, or salt water—that perfectly seals joints around metal fittings—that retains its toughness under widely varying temperatures—and can be readily repaired without special tools or heat if the coating should be cut by a sharp blow. This "Maplac" coating offers great moisture resistance and has electrical resistivity that exceeds the voltage withstand tests of the wood insulation.

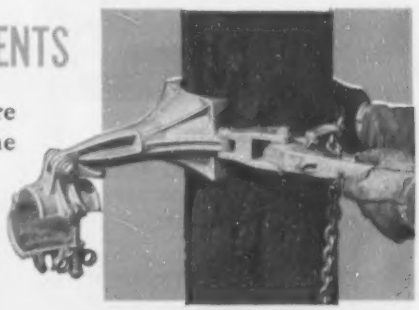


2. ALUMINUM FITTINGS

Chance Hot Line Tools are lighter in weight, where the weight is important, because the end fittings are made of heat-treated aluminum alloy. This weight reduction—with larger, stronger fittings—relieves the strain on the lineman—making hot stick work easier, safer and more efficient. Ask the men who use them! They prefer Chance Hot Line Tools because their light weight and good balance cuts down fatigue—makes them easier to use.

3. QUICK CLAMPING, SAFE LOCKING ATTACHMENTS

All Chance Hot Line Tools which require mounting on poles are equipped with this light weight chain tightener that clamps the tool quickly to the pole by a simple lever operation. A specially designed safety catch automatically and securely locks the tool support in place. The latch cannot be released unintentionally or accidentally. A half link adjustment of the chain assures a snug fit on any pole.



A·B·CHANCE CO·

CENTRALIA, MISSOURI · SAN FRANCISCO, CALIFORNIA

CN3944

first

IN SIMPLICITY EFFICIENCY LOW COST

LUMATROL®

Omni-Directional Photoelectric Light Switch integrates light from all directions . . . completely reliable in any weather, 12 months of the year!

LUMATROL offers *fully* automatic light control that is simple, reliable, compact and easy to install. LUMATROL can be used with, or easily adapted to, *virtually any outdoor lighting requirement*, regardless of location, type of pole or luminaire!

Although considerably lower in cost, LUMATROL rates *FIRST* on all twelve specifications applied to this type control. Only ruggedized components are used. ACCURATE, POSITIVE SWITCHING OF ILLUMINATION IS ASSURED UNDER ALL CONDITIONS OF USE. Wherever specified, Lumatrol is producing marked economies in maintenance and service costs.

TYPICAL LUMATROL INSTALLATION ON WOOD POLES OVER HENRY HUDSON PARKWAY, NEW YORK CITY,

WRITE TODAY FOR TECHNICAL BULLETIN.

micro balancing

INCORPORATED

GARDEN CITY PARK, L. I., NEW YORK

® Trade Mark Reg. U.S. Pat. Off.

New Equipment

(*Continued from page* 172)

air-conditioning equipment where only 115 v is available. From two legs of the power line, 208 v. single-phase is boosted 10% to 228.8 v. Connected as an autotransformer, a 250-va unit can supply a 2.38-kva load. Details in Bulletin BB-199.

Acme Electric Corp, Water St, Cuba, N. Y.

Coming New Equipment

Received Too Late for This Issue

2.5-Amp Watthour Meter

General Electric Co—120 v or 240 v, Type I-50, for use with metering transformers

Fluorescent Luminaire

Line Material Co—Made of aluminum, uses four 6-ft lamps for street lighting

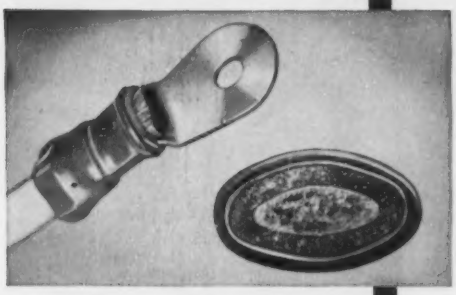
Booster Transformer

Portable booster transformer is rated 3 kva. Twist-Lock receptacles are supplied for 95, 105, 115, and 208 v input and 115 and 230 v output. Transformer is wound with silicone-enamel wire. Suggested application is for room air conditioners.

Marcus Transformer Co, Inc, Leesville Ave, Rahway, N. J.

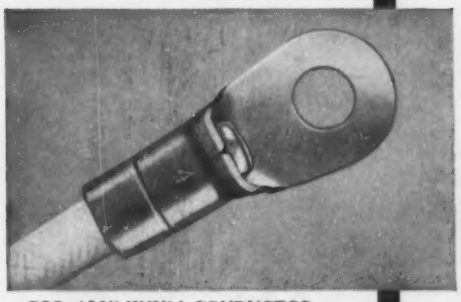
Pumping Control

Oil-well pumping control consists of across-the-line starter with overload protection and a Hand-Off-Auto



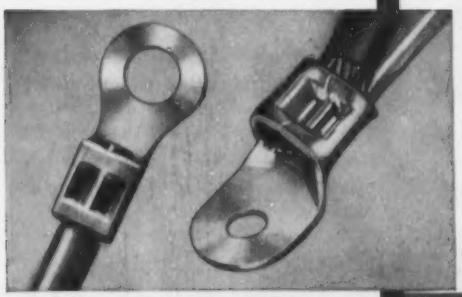
FOR AMPLI-BOND TERMINALS

A-MP's bonded insulation, Confined "C" Crimp, and insulation support features make precision-engineered AMPLI-BOND terminals the best quality insulated termination for copper wire. Special crimping head applies superior A-MP "C" Crimp for wire sizes 8 through 2.



FOR ALUMINUM CONDUCTOR TERMINATIONS

For applications where weight is the primary consideration, A-MP's novel cartridge type terminals, available in wire sizes 8 through 2, are applied with the same head as that used for AMPLI-BOND. These aluminum wire terminals offer, by way of insulation support, Confined "C" Crimp, and special inhibitor, a completely trouble-free termination.



FOR SOLISTRAND TERMINALS

The AMP W CRIMP for solid wire has two longitudinal indents which compress terminal and wire with a toggle action to produce a voidless, homogeneous mass within the crimp area. There is no finer crimp for solid, irregular shaped or combinations of these wire types.

Find out about the New AMP "CREATIVE APPROACH TO BETTER WIRING"

...An evaluation survey without cost or obligation.

NEW AMP LIGHTWEIGHT HAND HYDRAULIC TOOL

FEATURES:

- 6 TONS FORCE
- SWIVEL ACTION
- SPRING ACTUATED

More than one ton of force per pound of weight makes crimping even No. 2 terminals easier than ever before. Two styles of head are available, one for "W" Crimp, the other for "C" Crimp. The "W" Crimp is for solid and stranded wire and for uninsulated terminations. The "C" Crimp is for insulated terminations on stranded, copper wire and for uninsulated terminations of aluminum wire. Rotating nests or removable inserts give wide wire size range for each head.

It's light! Weighs only 5 lbs. Double lever action of new tool reduces pumping time effort—takes 50% less strokes than conventional hand hydraulic tools. Sudden decrease in pressure indicates to the operator that the crimp is completed.

Literature on tool and terminals available upon request.

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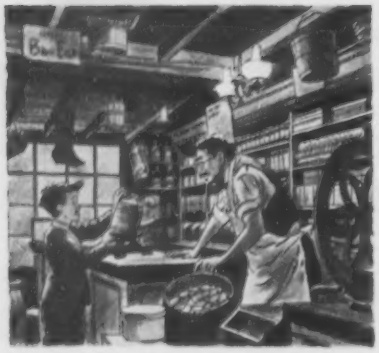
Aircraft-Marine Products, Inc.
2100 Paxton Street, Harrisburg, Pennsylvania
In Canada . . . . Aircraft-Marine Products of Canada, Ltd.
1764 Avenue Road, Toronto 12, Ontario, Canada

HAS YOUR LIGHTING KEPT PACE WITH PROGRESS?



You're always ahead with Sylvania Fluorescent Lamps because of Color Uniformity

In maintaining their leadership through the years, Sylvania has always insisted upon the highest standards of color uniformity in fluorescent lamps. Sylvania's color control system requires that each batch of fluorescent phosphors be subjected to stringent tests for color uniformity. In lamp after lamp, year after year, Sylvania Fluorescent Lamps offer you the world's highest value in dependability and constancy of color.

Check the other points of superiority about Sylvania Fluorescent Lamps and how they must assure complete satisfaction or your money back.*

*Try 24 Sylvania Fluorescent Lamps of any popular type. If, in your opinion they don't give more light and maintain color and brightness for a longer time than any other brand, send them back with your signed Certificate of Assurance and your money will be refunded.

LIGHT FOR FREEDOM
POWER FOR PROGRESS

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.
In Canada: Sylvania Electric (Canada) Ltd., University Tower Bldg., St. Catherine St., Montreal, P. Q.

LIGHTING • RADIO • ELECTRONICS • TELEVISION

selector switch together with an undervoltage relay, lighting arrestor, and motor-driven time switch.

Raintight enclosure may be pole or crossarm mounted. Control is rated 2-50 hp, 115/230 v, single phase or 220/440 v, 3-phase. The 50 hp, 3-phase, 440-v size measures 42 x 26 x 12 in.

Federal Electric Products Co, 50 Paris St, Newark 5, N. J.

HF VT Voltmeter

Video frequency vacuum-tube voltmeter, Type MV-22B, measures 20 cps to 10 Mc. Sensitivity is 70 uv; the highest range is 1,000 v. Accuracy is 3½% of full scale. Input is 1 megohm and 20 uuf without probe. With input divider probe to extend the range 10:1, input is 10 megohm and 6 uuf.

Millivac Instrument Corp, 444 Second St, Schenectady 6, N. Y.

MORE NEW PRODUCTS
about which you should know

Automatic Switch Co, Orange, N. J., has **battery charger** rated 0.05-2.0 amp at 6-32 v dc for emergency generator sets (Bulletin 203S) . . . McColpin-Christie Corp, 3410 W. 67 St, Los Angeles 43, Calif., has regulated dc **power rectifiers** rated 25-29 v up to 1,000 amp.

Bailey Meter Co, 1050 Ivanhoe Rd, Cleveland 10, Ohio, has universal **pneumatic transmitter** for telemetering and control systems . . . Industrial Instruments, Inc, 89 Commerce Rd, Cedar Grove, N. J., has **explosion-proof cases** for their controllers, indicators, and recorders.

Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark 5, N. J., has 7½-lb portable **circular recorder,** Model 6401 for 0.001-5 amp, 0.1-300 v; Model 6402 up to 5 amp or 300 v ac . . . Landis & Gyr, 45 W. 45 St, New York 36, N. Y., distributes Sodeco 5-digit **electrical counter** with electrical reset.

Lincoln Electric Co, Cleveland 17, Ohio has heavy-duty ac-type **welders** rated 300, 400, and 500 amp . . . Kas-

NEW MODERN CENTRALLY LOCATED PLANT

Serving the Entire U.S.!

New, Streamlined Plant for Making Dependable, Trouble-Free

Central TRANSFORMERS

Here's the ultra-modern, super-efficient new Central Transformer Corporation plant at Pine Bluff, Arkansas. 400 feet long by 200 feet wide, it has 80,000 square feet of ground floor space and 5000 square feet of second story space.

Naturally, the plant is equipped with the very latest machinery. There is a ten-ton traveling crane on one side, and a forty-ton on the other. This plant has complete testing facilities, including an impulse generator.

Remember, in Central Transformers you get skilled, conscientious workmanship, tried-and-proven dependability, minimum maintenance, long life, prompt, efficient service. *Specify Central!*

A Type for Every Need

CTC

Central TRANSFORMER CORP.

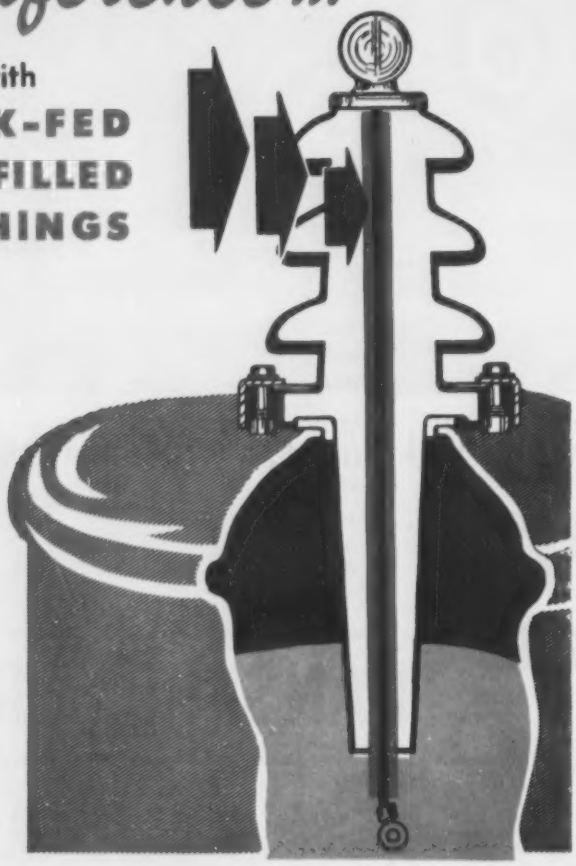
NEMA

PINE BLUFF, ARK.

Sales Offices in Principal Cities

RT & E *transformers are free from radio interference...*

with
WICK-FED OIL-FILLED BUSHINGS



Radio and television interference has existed in distribution transformers, due to corona inside the high voltage bushing. This corona and interference effect has been eliminated in R T & E transformers by the use of fiber glass filled bushings which extend into the transformer oil and provide wick-fed oil-filled bushings.

R T & E transformers are radio and television interference free even at 120% of rated voltage.

R T & E transformers have many other exclusive design advances that will save you time and money.

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632 N. 8TH ST
MILWAUKEE 3,
WISCONSIN

R T & E Co.

BRANCH PLANT:
WAUKESHA,
WISCONSIN

son Die & Motor Corp, 32-14 Northern Blvd, Long Island City, N. Y., has 65-lb **portable welder** rated 200 amp from 110/220 v 60 cps . . . Erico Products, Inc, 2070 E. 61 Pl, Cleveland 3, Ohio has Caddy Taper-Lok quick **connector** for welding cables.

Cal-Tronics Corp, 11307 Hindry Ave, Los Angeles 45, Calif., has precision **ratiometer** to measure impedance ratios or resistors . . . Fischer & Porter Co, 22 Jacksonville Rd, Hatboro, Pa., has Digi-Coder, a **digital converter** which converts analog data to digital or other codes.

Allied International, 230 Park Ave, New York 17, N. Y., has portable electric **generator** rated 6-7.5 v, 25 amp, weighs 34.7 lb (Bulletin G) . . . Porter-Cable Machine Co, 46 Exchange St, Syracuse 8, N. Y., has Model 16 heavy duty ½-in. **electric drill** for 115 v ac-dc, with locked-rotor torque of 64 ft-lb.

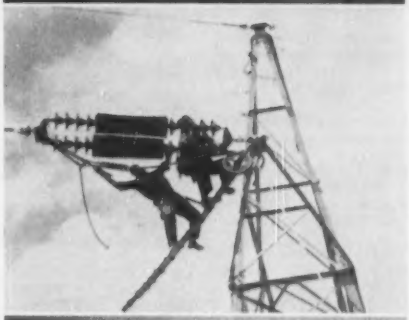
Square D Co, 4041 N. Richards St, Milwaukee 12, Wis., has protected **starters** and control for air conditioning, 1 hp at 115/240 v ac or dc (Bulletin 2510-A) . . . Westinghouse Electric Corp, Box 2278, Pittsburgh 30, Pa., has weatherproof **capacitors** for 460 v, 3-phase, 2, 3, 4, 5, and 6 kvar.

Fisher-Pierce Co, Inc, 63 Pearl St, S. Braintree, Boston 85, Mass., has **photoelectric light switch** for homes . . . Sightmaster Corp, New Rochelle, N. Y., has neon-indicating renewable **cartridge fuses,** 30, 60 amp, 250 v and 30 amp, 600 v.

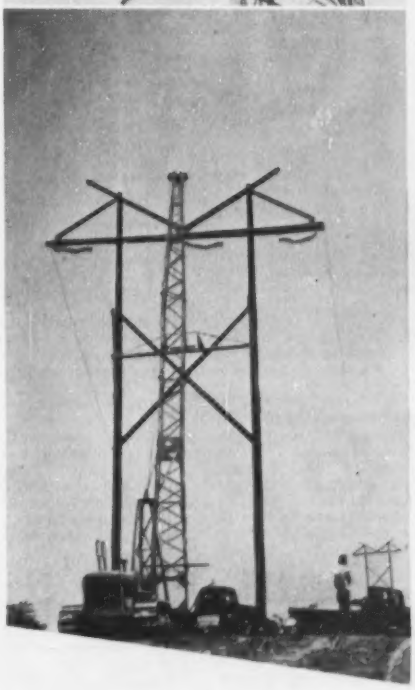
Cincinnati Sub-Zero Products, 3930 Reading Rd, Cincinnati 29, Ohio, has a 1 cu ft Model A-120-1 **cold test unit** for -120F, weighs 500 lb . . . Sierra Electronic Corp, 1050 Brittan Ave, San Carlos 2, Calif., has **carrier-current voltmeter,** Model 104, for 5-150 kc, -80 to +42 dbm at 600 ohms, with accuracy of ±1 kc, ±2 db.

Russel Reinforced Plastics Corp, Lindenhurst, N. Y., has flame retardant, self-extinguishing insulation **laminate** (Repco GOC Grade) of polyester resin (Laminac 4146) reinforced with Fiberglass Mat . . . Bishop Manufacturing Corp, 6 Canfield Rd, Cedar Grove, N. J., has self-bonding insulating **tape** (BI-SEAL) in 7 colors.

Top parts of steel tower are lowered into place by big crane.



Dead-ending conductor on steel tower. Note care taken to prevent damage to insulators.



Single circuit tangent wood structure is set by some of our own special equipment.

90 Miles

OF 230 KV LINE OVER ROUGH COUNTRY

Construction of a transmission line, presenting many difficulties, was recently completed on schedule for The Public Service Company of Indiana. The line extends over 90 miles of rough hill country between Terre Haute and Columbus, Indiana.

900MCM ACSR conductors with 590 supporting wood pole "H" frame structures, ranging in size from 70 foot Class 1 to 95' Class 1 were used with 69 steel towers at angles and for long spans, one of which measured 2875'. That this big project was completed on time and energized on schedule can be credited to our highly skilled crews and the use of thoroughly modern and efficient equipment.

This project is typical of the utility construction work which our company is well qualified to undertake. Our past success is assurance that we can do the most extensive jobs with cost savings and with speed. If your company is planning transmission, distribution or underground work, we would appreciate going over the project with you and submitting our proposal.

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CONSTRUCTION COMPANY, INC.

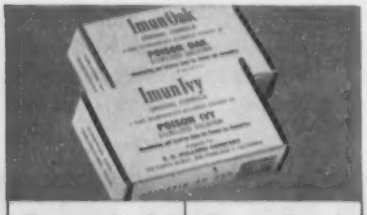
528 South 15th St. Vincennes, Indiana

Overhead Transmission and
Distribution Line Construction
Substation Construction
Underground Distribution
Installation

FIGHT SUMMERTIME HAZARDS!

VENEX*—FOR SNAKE BITE

Here's complete treatment for snake bite in a compact pocket packet. The Venex kit is simplified so the victim can treat himself. Medically approved venom-extraction method works immediately removing poison.



ImunOak* FOR POISON OAK | **ImunIvy*** FOR POISON IVY

Build immunity or treat the effects of these poisonous plants with ImunOak or ImunIvy. Easily administered orally or injected by a physician, these extracts have proven clinical records of prompt and marked relief.

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CATALOGS AND BULLETINS

● **WESTINGHOUSE BOOKLETS:** Following are available from Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.:

B-6161 Handbook for Selection of Industrial Electric Heating Units—23 pages

B-5916 Outdoor Metering Outfits, Type MP; 2.4-115 kv, three phase; 15-161 kv, single phase—4 pages

● **INFRARED HEAT:** A 4-page bulletin describes Infralite radiant heaters, 6-72 in. long, 100-10,000 w, 115-230 v. N. J. Thermex Co, 535 Bergen St, Harrison, N. J.

● **MOTORS:** Bulletin B-2102, 12 pages, covers selection of squirrel-cage motors, 1-200 hp. Reliance Electric and Engineering Co, 1076 Ivanhoe Rd, Cleveland 10, Ohio.

● **PHOTORECORD PAPER:** Photorecording Papers and Films, 4 pages, covers selection of film for oscillographs and other instruments. Eastman Kodak Co, Rochester 4, N. Y.

● **TEMPERATURE CONTROLS:** Bulletin 102, 2 pages, covers Models V-1C and V-1X for high temperature alarms and cut-outs up to 1800F, rated 15 amp, 125-250 v, 60 cps. Burling Instrument Co, 16 River Rd, Chatham, N. J.

● **INSTRUMENTS:** Following are available from Minneapolis-Honeywell Regulator Co, Wayne & Windrim Ave, Philadelphia 44, Pa.:

Catalog 5001 Industrial instruments and equipment, composite catalog—24 pages.

Bulletin 6430 Dual temperature controller—2 pages.

Bulletin 9050 Instrumentation for steam generation—28 pages.

● **PUMP:** Bulletin W-318-S27, 2 pages, covers Type UNB 2-stage centrifugal pump, rated 400 psi and 1,300 gpm max. Worthington Corp, Harrison, N. J.

● **TOGGLE SWITCHES:** Catalog 73a, 12 pages, covers toggle switches. Minneapolis-Honeywell Regulator Co, Freeport, Ill.

● **MAGNET COILS:** Electrical Windings & Magnet Coils, 6 pages, contains complete magnet wire characteristics table, also useful formulas on resistivity, temperature coefficients, etc. Jeffries Transformer Co, 1710 E. 57th St, Los Angeles 58, Calif.

● **RESISTORS:** A 20-page 1954 catalog covers power rheostats 25-150 w and fixed resistors 3-200 w. Tru-Ohm Products, 2800 N. Milwaukee Ave, Chicago 18, Ill.

● **GROUND DEWATERING:** A 76-page 1954 catalog illustrates use of a wellpoint system to predrain and stabilize wet soils before construction work. Moretrench Corp, Rockaway, N. J.

● **UTILITY DESK:** An 8-page catalog covers utility desk assemblies adaptable for control cabinets. Par-Metal Products Corp, Long Island City 3, N. Y.

● **DRY TRANSFORMERS:** Catalog H-10-101, 14 pages, covers data on 60 cps, dry-type transformers with 240, 480, or 600 v pri and 120/240 or 120/208 sec—Type HA, 0.1-1.0 kva, single phase; Type HB, 1.5-10 kva, single phase; Type HC, 15-200 kva, single phase; and Type HD, 10-300 kva, 3 phase, delta-wye. Harrison Transformer Corp, Brown Ave, Springfield, N. J.

● **SWITCHGEAR:** Following are available from I-T-E Circuit Breaker Co, 19th & Hamilton St, Philadelphia 30, Pa.:

Bulletin 6004A, 24 pages, covers features of metal-enclosed switchgear, 600 v ac, rated through 6,000 amp, 15,000-100,000 amp interrupting, for indoor and outdoor use.

Bulletin 7004B, 20 pages, covers features of metal-clad switchgear, 4160 v, through 2,000 amp, 250,000 kva interrupting.

Bulletin 5107D, 4 pages, covers individually enclosed air circuit breakers, up to 600 v, 6,000 amp, 100,000 amp interrupting.

● **INSTRUMENTS:** Circular M-2-A, 48 pages, covers mechanical instruments—distant-reading dial thermometers, recorders (9, 10, 12 in. circular), controllers, and diaphragm-motor valves. Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark 5, N. J.

● **PRINTED CIRCUITS:** An 8-page 1954 brochure covers printed-circuits, facilities, and techniques. Photocircuits Corp, Glen Cove, N. Y.

● **TRACTOR:** A folder covers specifications on 150 hp DW15 rubber-tired tractor for use with earth-moving equipment. Caterpillar Tractor Co, Peoria, Ill.

● **CATALOG:** Revisions for the L-M catalog are: Master Check List (5-54), General Index (5-54), Bulletin DL6 (11-54), and Bulletin DT1 (10-53). Additions are Bulletin LA6 (1-54), 4 pages, on Type L signal arrester for low-voltage circuits; and Bulletin SCE3 (2-54), 8 pages, covering Uni-Ballast series street-lighting system for directly connected mercury vapor lamps. Line Material Co, 700 W. Michigan St, Milwaukee 1, Wis.

● **PLATING RECTIFIERS:** Bulletin B20-54 lists types of electroplating rectifiers, regulators, and controls—8 pages. Wagner Brothers, Inc, 400 Midland Ave, Detroit 3, Mich.

● **CIRCUIT BREAKERS:** Catalog 585, 8 pages, covers Type RHE reclosing oil circuit breakers, 115-287.5 kv, 15,000,000 kva interrupting capacity. Pacific Electric Manufacturing Corp, 5815 Third St, San Francisco 24, Calif.

● **FAULTFINDER:** An 8-page bulletin describes the Brunt Faultfinder, used for locating grounds in normally ungrounded circuits. Instruments sends about 2 amp of 100 cps current through faulty line. Fault is traced by operator with earphone and exploring coil. It may be used on hot circuits up to 550 v. Parr Manufacturing Corp, 44 Austin St, Newark 5, N. J.

● **RADIO:** Folder, 4 pages, gives specs on Type MRT-10( ) Series mobile radiotelephone which is rated 40 w, 25-50 Mc, 6 or 12 v. Bendix Aviation Corp, Baltimore 4, Md.

● **SMALL TRANSFORMERS:** Catalog TR-54, 28 pages, covers communication transformers, chokes, and toroids and amplifier kits. Triad Transformer Corp, 4055 Redwood Ave, Venice, Calif.

● **REFLECTORS:** Bulletin C, 20 pages, covers silver-mirrored symmetric reflectors for interior lighting. Pittsburgh Reflector Co, Oliver Bldg, Pittsburgh 22, Pa.

● **RESIN COATING:** Bulletin 400, 4 pages, covers furan-base resin coating, chemically resistant to 190F. Carboline Co, 331 Thornton Ave, St. Louis 19, Mo.

● **COLD LIGHTING:** Folder describes industrial cold-cathode lighting fixtures, lamps, and ballasts rated 25,000 hr. Celine, Inc, St. Charles, Ill.

● **TURBINE:** Bulletin H-22, 16 pages, covers design features and proper control for Type YR mechanical drive turbine. Elliott Co., Jeannette, Pa.

● **CONTROL CENTERS:** Bulletin F5265-1, 8 pages, covers control centers. Barber-Colman Co, Rockford, Ill.

HOW DO YOU PLAN TO MEET GROWING DISTRIBUTION LOADS?
By adding more feeders or increasing feeder size . . . by installing voltage correcting devices . . . by adding or enlarging existing substations . . . or by changing to higher voltage? Whatever the method, you can count on Graybar for prompt, efficient deliveries of all the materials, equipment, and supplies you'll require. From the top of the pole to the bottom of the hole, Graybar offers you a *single source*, a *single responsibility* for all pole-line maintenance and construction needs.

To meet new load demands . . . rely on Graybar

MAKE THE MOST OF THESE 3 GRAYBAR "PLUS" SERVICES

Graybar provides accurate catalog and quotation information on more than 100,000 different electrical items—the products of over 300 leading supplier-manufacturers.

Graybar maintains local stocks of tools and utility standard items. We can supply hardware, poles, static wire and insulators for any structure specifications and even prefabricated transmission structure assemblies.

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GraybaR Everything Electrical

GraybaR **ELECTRIC CO., INC., 420 Lexington Avenue, New York 17, N. Y.**

IN OVER 110 PRINCIPAL CITIES

See the following pages for more information about items manufactured by typical Graybar suppliers.

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TWO GREAT NAMES
THAT SPELL SERVICE TO
ELECTRIC UTILITIES...

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PRODUCT AVAILABLE VIA
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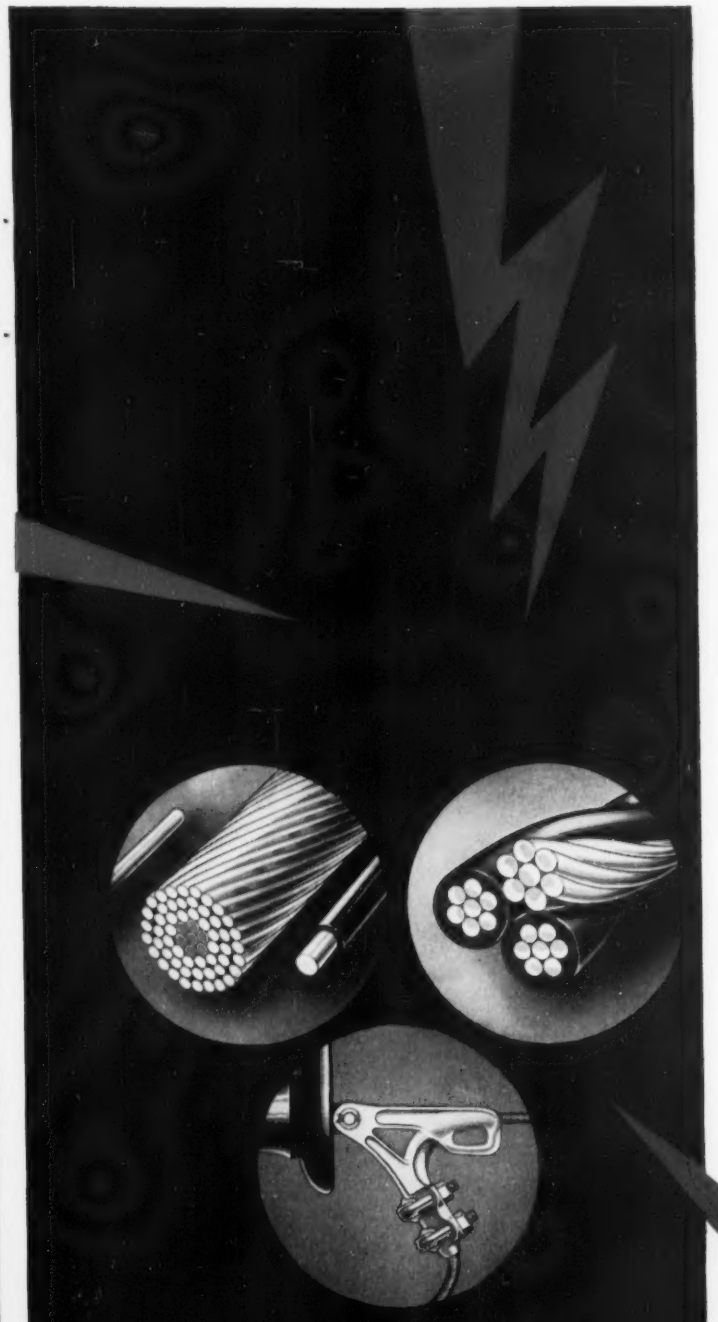

ACSR and All-aluminum Wire and Cable
Covered Wire and Service Drop
Accessories for All Conductors

Alcoa and Graybar offer you a complete line of aluminum conductors and accessories from one handy source that can relieve you of a lot of headaches.

In Graybar you have a single local source for all your aluminum conductor and accessory requirements. Less paper work and fewer problems of co-ordinating delivery schedules with various suppliers.

In Alcoa you have the only manufacturer of a complete line of aluminum conductors and accessories that are made for each other. The knowledge acquired through years of field service is built into the design of every item in the Alcoa line.

So remember—for better service—call Graybar, specify Alcoa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA
Alcoa Building • Pittsburgh 19, Pa.

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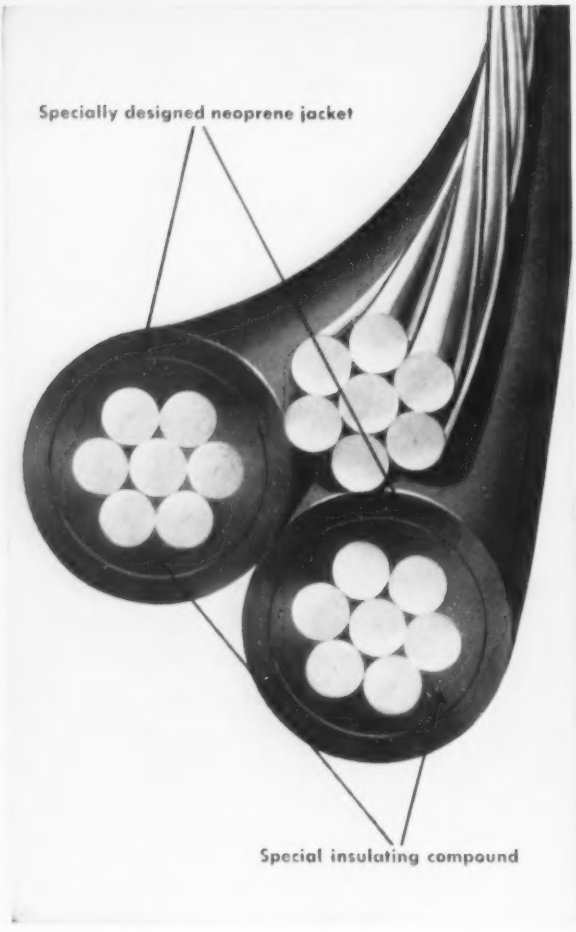

DOUBLE PROTECTION is important feature of Anaconda 2 + 2 Type N-SD service drop. Note inner and outer layers.

CABLE ENDS of Anaconda 2 + 2 Type N-SD are quickly and easily made ready for service connection.

Unique construction gives Anaconda 2+2 Type N-SD Cable double protection

NOW Anaconda offers a new Type N-SD service-drop cable – called 2 + 2. *Each* of its two conductors is covered with not one–but *two* durable, protective layers.

One layer is a fine insulating compound. The other is a tough jacketing material.

The compound for the inner layer has built-in electrical qualities – designed for heat and moisture resistance.

The outer layer is in fact a specially designed neoprene jacket – best for wear and weather resistance.

Together these two layers give *double* protection. That means longer life . . . greater service reliability.

See this cable for yourself. The Anaconda Representative nearest you will be glad to show you samples...and to answer your questions. Call him today. Or for more information, write *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

B4448

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Power cables of all description • service and overhead distribution cable, bare and weatherproof, including ACSR • signal, control and communication wire • portable cords and cables • network cable • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

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Graybar Distributed by Graybar Electric Company

"American Brand"

Premium Grade

Manila Utility Rope

MADE IN ALL DIAMETERS FROM 1/4" THROUGH 1"

FOR HAND LINES, POLE LINES, GUY ROPES, HOISTING AND RIGGING.

designed and constructed especially for utility uses

This new rope has been created especially for utilities. Extensive field tests under the most rigorous conditions have proved it vastly superior to ordinary rope.

Only the choicest of Manila fiber is used for Utility Rope. The special construction and exclusive lubricant keep water absorption at a minimum.

Its resistance to weathering is excellent. Get more service for your rope dollar. Buy "American Brand" Manila Utility Rope. Costs a little more—worth it!

Order "American Brand" Utility Rope from Graybar Warehouses in more than 110 principal cities.

A product of

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Noble and West Sts., Brooklyn 22, N. Y.

Look for the single green strand that identifies "American Brand" Manila Utility Rope

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4 REASONS WHY RAINIER CROSSARMS belong in YOUR pole-line program

1 **SELECTION** — Extra value in crossarms, as in many other quality products is the end result of *planned manufacture*. With American Crossarm and Conduit Company, careful selection of timber for manufacture of Rainier crossarms is the first important step.

2 **KILN DRYING** — Rainier kiln drying is superior because of scientific control during the seasoning period — correct temperature and the right humidity all the time while in the kiln means all fungus growth killed—timber seasoned throughout.

3 **SEASONING**—Rainier air seasoned crossarms are also carefully seasoned by control of air circulation and by the location of the seasoning sheds, as well as proper piling of the timber during the drying period.

4 **STOCKS** — The American Crossarm and Conduit Company, manufacturers of Rainier crossarms, through Graybar offer the careful buyer of crossarms an additional service — stocks at strategic locations. For planned-ahead buying or for emergencies, this fact is your assurance of lower shipping costs — quicker service.

Remember! A crossarm produced from improperly or carelessly processed timber might cost less at the time of purchase, but it certainly *is not cheaper per year of life service.*

For further information on crossarms that may pay you dividends in lowered maintenance and replacement costs, write or phone your nearby Graybar Line Construction Specialist. Graybar is located in over 110 principal cities.

AMERICAN · CROSSARM AND CONDUIT COMPANY

RAINIER WOOD PRODUCTS TRADE MARK

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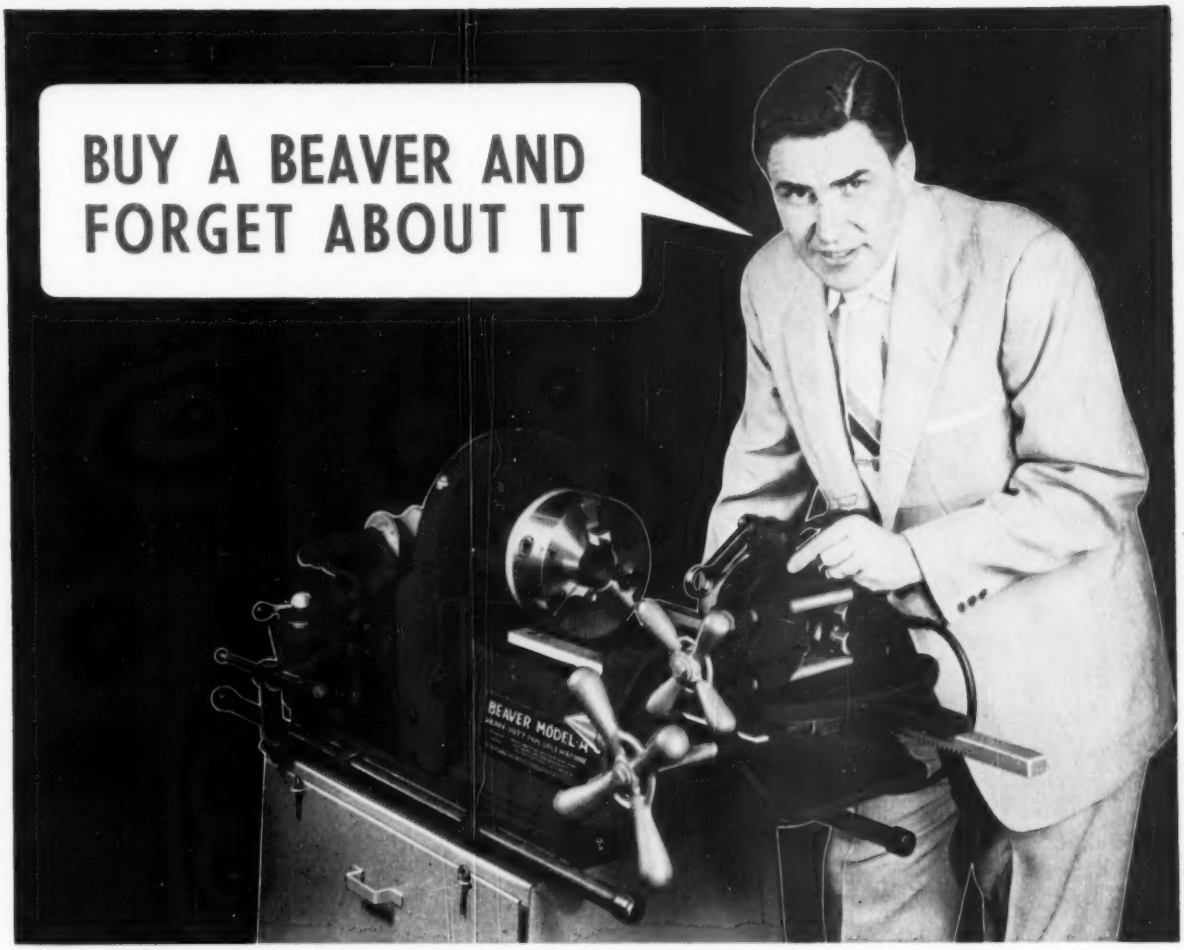
Distributed by Graybar



Beaver machines are made with lathe-like precision, yet are as rugged as power shovels. They can be depended upon to "deliver the goods" job after job . . . no costly down time for repairs or adjustments. When you buy a Beaver, you're assured of a quality product, manufactured by an experienced company. That's why we say "Buy a Beaver and forget about it!"

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A quick-reference catalog giving complete information, sizes and prices on each Beaver unit—three pipe machines, two power units and complete range of hand tools 1/8 to 12-inch. Write for yours today!

CHECK THESE AMAZING BEAVER FEATURES!
The BEAVER Model "A" Pipe and Bolt Machine.

● Right-handed operation . . . like a lathe. • All controls in front . . . at finger tips. • Chuck to the left, tool mounting to the right. • All gears run in oil. • Inverted chip-free rack-and-pinion feed. • Full 12-inch open working space. • Heavy-duty 1/8 to 2-inch chuck. • Swinging arm 1/8 to 2-inch reamer. • Oil pump accessible for easy cleaning. • Ring-type adjustable quick-opening die heads—no hinge to get fouled with chips. • Choice of ball-bearing wheel-and-roller cutoff or automatic cutoff. • Units are interchangeable. • Motors available in all types and voltages. • Ample power to cut and thread up to 12-inch pipe. • Patented outboard pipe rest and safety switch lock. • Net weight about 370 pounds. • More than 200 different kinds and sizes of dies available!

BEAVER PIPE TOOLS

256-300 Dana Ave. • Warren, Ohio, U. S. A.

"53 Years of Highest Quality"

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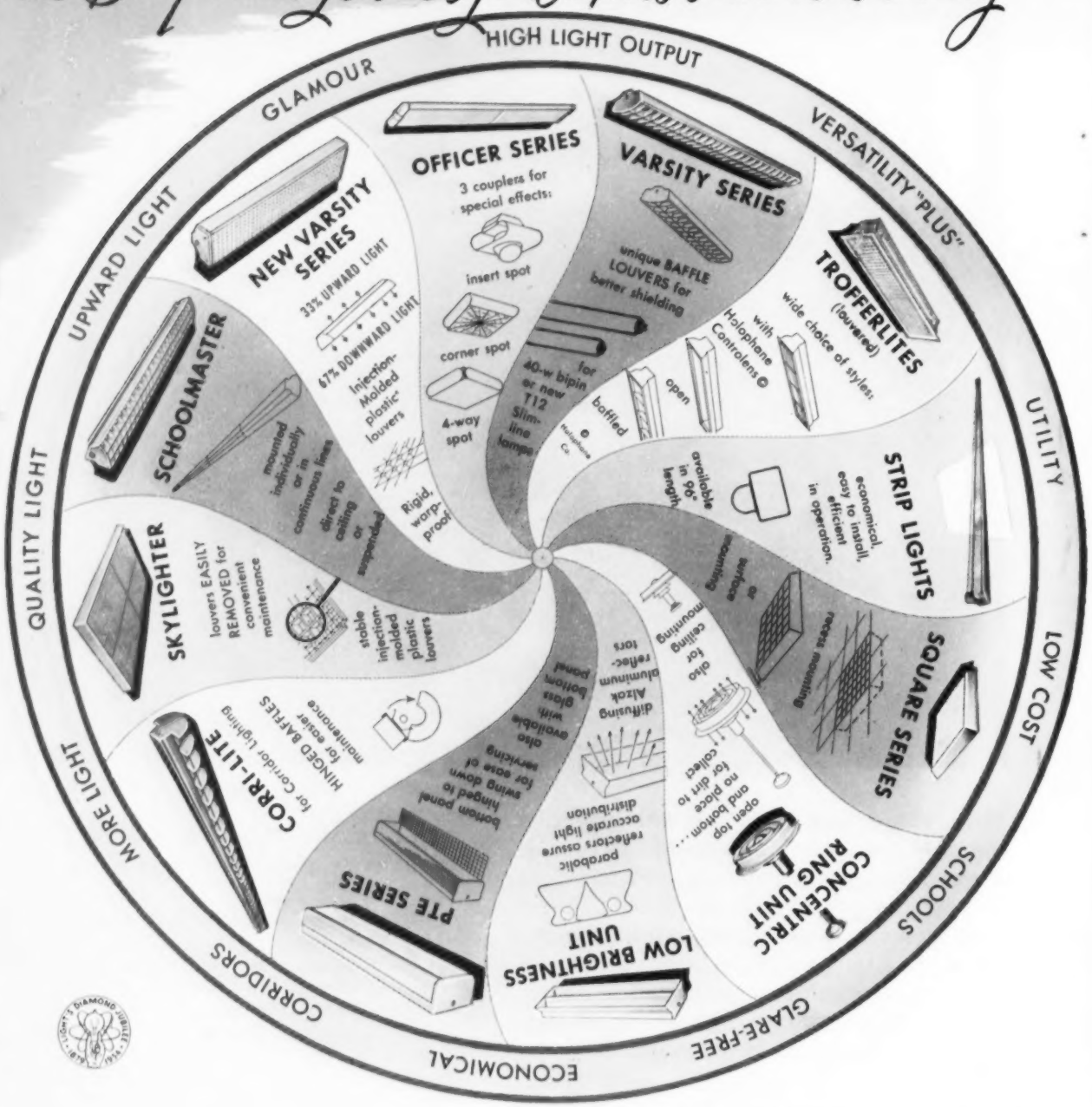
the Benjamin Leader Line...First in Versatility



Benjamin Electric Mfg. Co., Leader Division, Dept. K, Des Plaines, Illinois, also makers of famous Benjamin lighting equipment and sound signals for Industry, Institutions and Commerce.

Nothing is left to chance or compromise when you choose from the Benjamin Leader Line "Wheel of Versatility." One look at the wide range of fixtures and features tells why the Benjamin Leader Line is FIRST in Versatility, no matter what your basis for selecting lighting equipment. Be it first cost or economical upkeep... lighting for effect or high footcandle levels... whether you're trying to match existing architectural treatment or striving to achieve a new, modern decor... Benjamin Leader Line VERSATILITY enables you to find exactly the lighting unit you need. FREE Catalog Data Sheets contain complete details.

BENJAMIN

R-330 GJ

Leader Line

Sold Exclusively through Electrical Distributors

Exclusive licensee of the Leader Line in Canada: Robertson Irwin Limited, Hamilton, Ontario

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Graybar Distributed by Graybar

YOU KNOW IT'S RIGHT WHEN YOU SPECIFY CHANCE

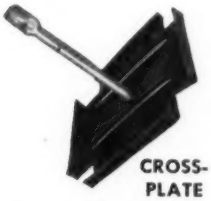
the best in line construction and maintenance equipment

CHANCE ANCHORS MEET EVERY GUYING NEED

8-WAY EXPANDING
The guy load is distributed all around the anchor—no wasted space between blades. Usually installed in clay or loam.

NO-WRENCH SCREW
For hand or machine installation. Pitch-controlled blade goes down faster and adds to holding power in sandy soil, soft clay or loam.

NEVER-CREEP
Made of structural steel. Pulls *entirely* against solid, undisturbed earth. For extra heavy loads in clay or loam.



CROSS-PLATE
For heavy-duty anchoring in machine-bored holes. Holds better than logs or slugs. Saves time and money.

SWAMP SCREW
For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.

8-WAY CONE
Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.

EXPANDING ROCK
No grouting necessary. The greater the pull, the tighter it wedges against solid rock. Set in 2" drilled hole.

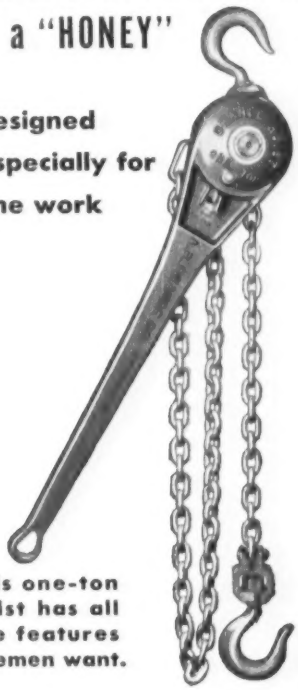
WRENCH TYPE SCREW
All steel—double arc welded. Anchor hub absorbs installation strain. For light loads in sandy soil, soft clay or loam.

POLE KEY ANCHOR
Keys poles at the butt to reinforce them against unbalanced loads in soft soil. Ideal for congested urban areas.

C54-17

Linemen call this hoist a "HONEY"

designed especially for line work

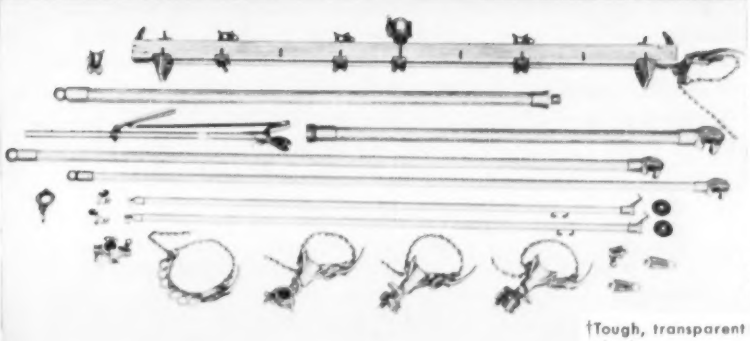


This one-ton hoist has all the features linemen want.

Maplac† covered, splinter proof Pike Poles

The plastic coating—like that used on Chance hot line tools increases the service life and adds to the safety of these pike poles.

Maplac† covered—Aluminum fitted Hot Line Tools



†Tough, transparent plastic

AGP*

Keeps Tap Connections Troublefree

*Aluminum General Purpose. Coated with fortified cadmium. Protect your conductor with the clamp that's ahead of the trend.

A·B·CHANCE CO·

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by Graybar

Now!...

An INTERRUPTING RATING in EXCESS of 100,000 AMPERES *for every set of fuse clips in your plant* . . . simply by installing FUSETRON *dual-element* FUSES

The Biggest Electrical Protection NEWS Since BUSS invented the FUSETRON Dual-Element FUSE

FUSETRON is a trademark of the Bussmann Mfg. Co., Division of McGraw Electric Co.

In 1947 tests made by the Electrical Testing Laboratories of New York, showed that on a circuit set to deliver 50,000 amperes, FUSETRON fuses in all tests cleared the circuit safely.

50,000 amp. Interrupting Capacity in 1947
becomes
100,000 amp. Interrupting Capacity Today

After years of intensive development work on FUSETRON fuses new tests were conducted under conditions that simulated the most severe field conditions and these tests were witnessed and verified by the Electrical Testing Laboratories of New York.

On circuits set to deliver in excess of 100,000 amperes, 30 to 600 ampere, 250 and 600 volt FUSETRON dual-element Fuses on each and every test cleared the circuit without belching flame or venting hot gases and with comparatively little noise.

Oscillograms of these tests interpreted by the Electrical Testing Laboratories, showed that the total available amperes including the direct current component, reached values as great as 165,000 peak amperes on 240 volt tests and as high as 212,000 peak amperes on the 535 volt tests.

This indicates that an interrupting rating of 100,000 amperes for FUSETRON dual-element fuses is a conservative one.

No interference with time-lag

In the development work to increase interrupting capacity in FUSETRON fuses it was kept in mind that the time-current characteristic must be maintained. Time-lag is of utmost importance to give proper motor and electrical protection and to eliminate needless blowing of fuses.

Remarkable results have been achieved. Interrupting capacity has been greatly increased while the time-current characteristic of FUSETRON fuses has in no way been disturbed.

Play Safe – install Fusetron Fuses throughout the entire electrical system!

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR ELECTRIC COMPANY

Think!...

ALL THIS ADDED SAFETY *without changing a panelboard or switch*... *plus* 10 Point Protection of FUSETRON *dual-element* FUSES!

Maximum Safety

With FUSETRON Fuses there is no cascading of interrupting rating — no places where an excessive fault current might cause serious damage. Every FUSETRON fuse has an interrupting rating in excess of 100,000 amperes.

You don't have to worry about selecting chosen spots in which to *pay extra* for "safe" equipment. Wherever a FUSETRON fuse is installed you have safety as sure and dependable as you can buy — no matter what you pay.

No Maintenance Costs

When FUSETRON fuses have once been installed properly you can forget about them. They need no periodic inspections to see if they will operate safely.

Dust, fumes, corrosion or age cannot prevent a FUSETRON fuse from opening safely. There are no hinges, pivots or contacts to stick or slow down the operation of the fuse on short-circuit.

With FUSETRON fuses — you get safety — without one cent spent for inspection or maintenance costs.

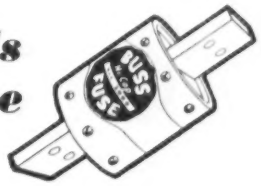
No Recalibration Costs

When a FUSETRON fuse does blow, there is no recalibration needed. As quickly as the fault in the circuit is corrected, you slip in a new fuse that has been CALIBRATED AT THE FACTORY BY ENGINEERS— a fuse that is as safe and dependable as the one that blew.

PLUS 10 POINT Protection with FUSETRON dual-element FUSES

1 Protect against short-circuits. **2** Protect against needless blows caused by harmless overloads. **3** Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation. **4** Provide thermal protection — for panels and switches against damage from heating due to poor contact. **5** Protect motors against burnout from overloading. **6** Protect motors against burnout due to single phasing. **7** Give DOUBLE burnout protection to large motors — without extra cost. **8** Make protection of small motors simple and inexpensive. **9** Protect against waste of space and money — permit use of proper size switches and panels. **10** Protect coils, transformers and solenoids against burnout.

for SAFE PROTECTION on loads above 600 and up to 5000 Ampere install BUSS Hi-Cap FUSES



Tests have shown that BUSS Hi-Cap fuses have unlimited interrupting capacity on circuits of 600 volts or less.

They are designed to give protection against dangerous overloads as well as high fault currents — yet their speed of operation on heavy shorts limits currents to safe values. This minimizes damage to equipment and cuts down dangerous stresses on transformers.

When coordinated properly with FUSETRON dual-element fuses they will not open ahead of the fuses nearest to the fault. Thus trouble is isolated to the part of the circuit in which the fault occurs.

Added SAFETY on Old Installations

On installations where the increase in the capacity of the circuit has outgrown the interrupting rating of the circuit breakers, BUSS Hi-Cap fuses offer a safe and relatively inexpensive way to protect inadequate breakers against rupture in event of a bad fault.

ACTION THAT SAVES YOU MONEY

By passing the word along that all purchase and stock records should call for FUSETRON fuses on loads up to 600 amps—and BUSS Hi-Cap fuses on loads above that — you get action that begets money saving.

For blowing time charts or more information on FUSETRON Fuses and BUSS Hi-Cap Fuses write for Bulletins FIS and HCS.

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo. Division McGraw Electric Company

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GraybaR

NEW

CURTIS TROFFERS

OFFER ALL THESE OUTSTANDING FEATURES:

1. High levels of quality illumination.
2. Visual Comfort Index rating of 97+.
3. Use with all 4′, 5′, and 8′ lamps . . . rapid start, slimline, low-brightness, starter type.
4. Aluminum, finished by the patented ALZAK PROCESS AFTER FORMING, or . . .
5. Steel, finished with exclusive Curtis baked white "Fluracite" Enamel.
6. Shallow housing permits installation where recessing depth is as little as 6⅞″.
7. Exclusive "U" support yokes which permit one-man installation in any type ceiling construction and cut installation time almost in half.
8. Flange or Flush type construction with and without louvers.
9. Lower maintenance cost. No horizontal reflecting or diffusing surfaces to collect dust.
10. Complete factory assembly with wiring channel and side reflectors formed of one piece aluminum or steel—simplified ordering —each troffer a complete unit.

CURTIS LIGHTING, INC.

Over 10,000 Curtis Alzak Aluminum Troffers are now being installed in the new Republic National Bank, Dallas, Texas.

Write DEPT. CT-17 for complete specification data

6135 WEST 65TH STREET, CHICAGO 38, ILLINOIS

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR ELECTRIC COMPANY

fill all your portable hoist needs from one reliable source

OVER A HUNDRED SIZES AND MODELS OF COFFING HOISTS

CLEVIS-CONNECTED HOISTS

eleven models — ¼- to 10-ton capacities

SPUR-GEAR HOISTS
(single chain)

eight models — ¼- to 2-ton capacities

SAFETY-PULL RATCHET LEVER HOISTS

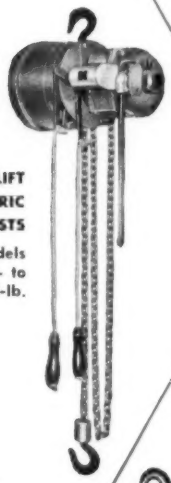
10 roller-chain models — 1,500- to 30,000-lb.
2 coil-chain models 1,500- and 3,000-lb.

MIGHTY-MIDGET PULLERS

two sizes — 500- and 1,000-lb. capacities

QUIK-LIFT ELECTRIC HOISTS

17 models — 500- to 4,000-lb.



CHALLENGER LIGHTWEIGHT ALL-STEEL SPUR-GEAR HOISTS

three models — ½-, 1-, and 2-ton capacities

SAFETY LOAD BINDERS

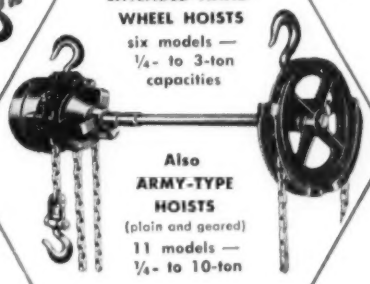
2 models — 3,000- and 6,000 lb.

Also HOIST BINDER
3,000-lb. capacity

EXTENDED HAND-WHEEL HOISTS

six models — ¼- to 3-ton capacities

Also ARMY-TYPE HOISTS
(plain and geared)
11 models — ¼- to 10-ton



SPUR-GEAR HOISTS
(multiple chain)
fourteen models — 3- to 25-ton capacities

DIFFERENTIAL CHAIN HOISTS

two sizes — ½- and 1-ton capacities

HOIST-ALLS

two sizes — 1-, and 2-ton capacities

LOW HEADROOM HOISTS

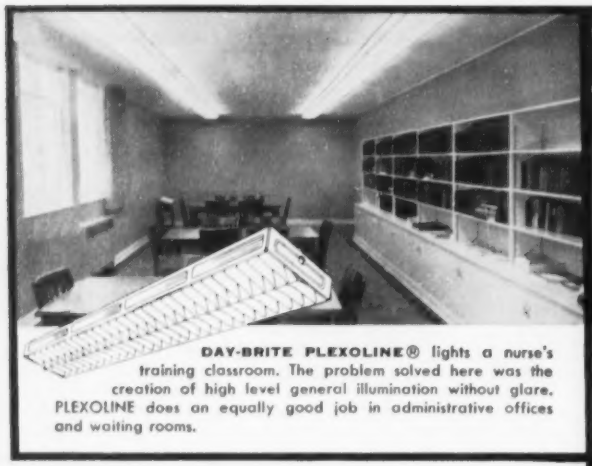
12 models — 1½- to 24-ton capacities

The broad Coffing line lets you select exactly the right hoist for the job. For more information on units you need, see your distributor, or write Dept. E6.

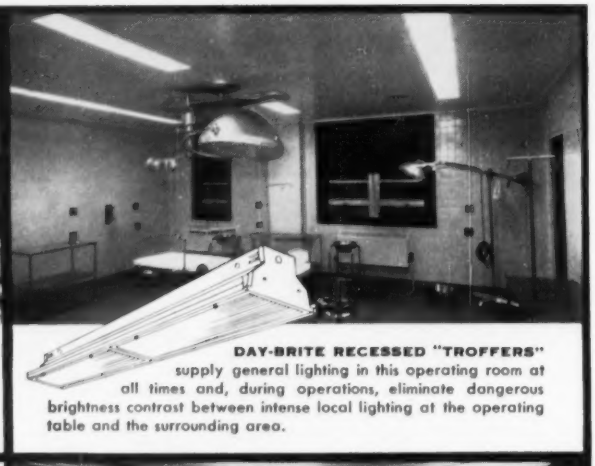
COFFING HOIST COMPANY
DANVILLE, ILLINOIS

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by Graybar



DAY-BRITE PLEXOLINE® lights a nurse's training classroom. The problem solved here was the creation of high level general illumination without glare. PLEXOLINE does an equally good job in administrative offices and waiting rooms.



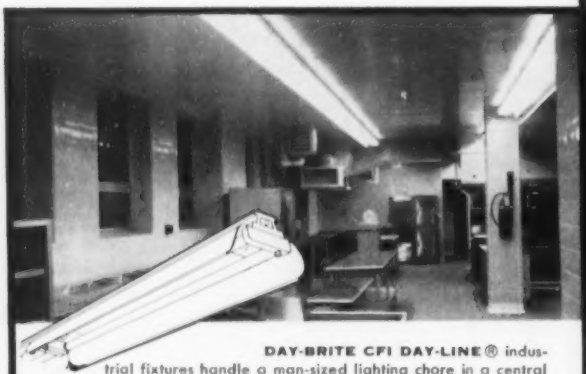
DAY-BRITE RECESSED "TROFFERS" supply general lighting in this operating room at all times and, during operations, eliminate dangerous brightness contrast between intense local lighting at the operating table and the surrounding area.

How to solve specific hospital lighting problems with

DAY-BRITE

These are actual Day-Brite hospital installations . . . each a "best buy" answer to one of the many lighting problems in this highly specialized field.

DAY-BRITE BED LAMPS are made specifically for patient room lighting. There's comfort and convenience here for the patient—direct light for reading, indirect light for general use. Sparkling stainless steel finish is easy to keep clean.



DAY-BRITE CFI DAY-LINE® industrial fixtures handle a man-sized lighting chore in a central kitchen. Here, as in other service areas, these rugged CFI's resist vibration, fumes and moisture, give you top performance under toughest conditions.

DAY-BRITE EXIT SIGNS mark emergency exits, direct corridor traffic in a large hospital. Doubly dependable, these trim, handsome Exit Signs are equipped with two sockets for continuous operation in the event one lamp fails. UL approved.

452

THE DAY-BRITE LINE gives you two great advantages when you engineer hospital lighting.

It's a *complete* line—giving you a wider selection of fixtures to meet the many and varied lighting problems in a hospital.

It's a *quality* line at *competitive prices*—giving you an extra edge in performance without throwing costs out of line.

Those two basic advantages of a Day-Brite specification are just as potent for your school, industrial, office and store lighting installations. Your Day-Brite representative has the facts and demonstrations to back up these promises.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5417 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR ELECTRIC COMPANY

UTILITY LIFTING JOBS MADE *QUICK AND EASY* WITH DUFF-NORTON JACKS

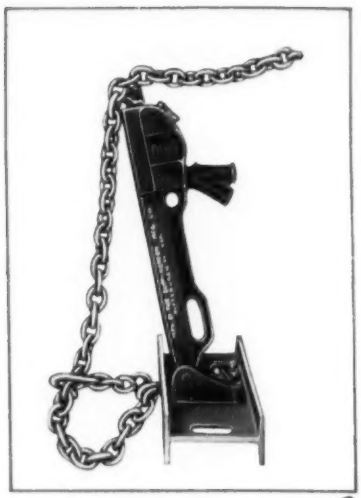
Duff-Norton Jacks save unlimited time, effort and money for light, power, street railway, railroad, telephone and telegraph companies, in maintenance of pipe lines, track, poles, bridges, heavy equipment, etc. There's a Duff-Norton Jack for every utility application. Write for data and proposal on these dependable jacks for your requirements.

CABLE REEL *Jacks*

Duff-Norton Cable Reel Jacks are standard with utility companies for lifting and holding heavy cable reels, because they meet the most exacting demands of utility crews under most adverse field conditions. Weatherproof, non-rocking, they provide rapid, even lifting and lowering.

Specifications				
Jack No.	Capacity Tons	Height Inches	Raise Inches	Weight Pounds
1030-CR	10	30	14	110

Other reel jacks are available with multiple hooks, for handling reels of varying diameters and weights.



POLE PULLING *Jacks*

Duff-Norton Pole Pulling Jacks pull or straighten utility poles without laborious digging. Hinged channel base permits jack operation at an angle or in upright position as required. "Service" need not be interrupted when these jacks are used.

Specifications					
Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Weight Pounds
529	5	28	18	7x16	91
500	15	37½	23	10x24	250

These Duff-Norton Jacks

SAVE UTILITIES TIME • ENERGY • MONEY

- **TRENCH BRACES**
- **HYDRAULIC JACKS**
- **AUTOMATIC LOWERING JACKS**
- **PUSH AND PULL JACKS**
- **SCREW JACKS**
- **AIR MOTOR POWER JACKS**
- **MANY OTHERS THAT MEET EVERY UTILITY NEED**

• WRITE FOR CATALOG 203

DUFF-NORTON JACKS — ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO, ONT.

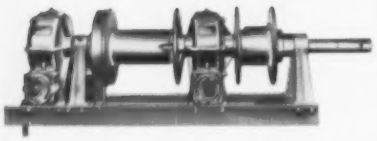
"The House that Jacks Built"

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by Graybar

EAGLE UTILITY TOOLS distributed by

Graybar
ELECTRIC COMPANY



EAGLE SINGLE & DOUBLE DRUM WINCHES

Models from 6,000 through 45,000 lb. capacities. Upright, underslung and front-mount models; extended shaft driven by same worm gear as clutched drum, and can be driven independently of either drum.

EAGLE "M" SERIES POLE TRAILERS

Exceptionally rugged trailers of 3 ton capacity. Furnished with two stationary bolsters and sliding uprights. Extension tongue pulls out to 11 feet 8 inches. Will carry about ten Class 7 Southern Pine Poles.

EAGLE "P-M" SAFETY BAR

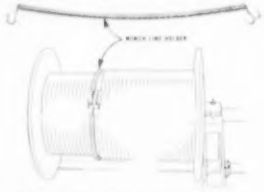
Saves time, speeds work, keeps pole completely under control during pulling and moving operation in line relocation. Eccentric chain binder and three sure-grip studs hold butt steady and safe. Twin telescoping legs.

EAGLE WINCH LINE HOOK

One-piece steel drop forging. Mushroom head fits into cable loop.

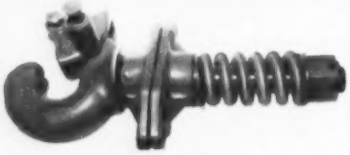
EAGLE WINCH LINE SAFETY HOOK

Anchors winch line to the truck when erecting the derrick.



EAGLE WINCH LINE HOLDER

Holds line tight on drum when not in use, or when using niggerhead on winch shaft. Heavy duty coil spring with single and double hooks.



EAGLE PINTLE HOOK

Spring mounted, single-acting type designed for easy mounting through rear truck cross member. Manual latch.

EAGLE UTILITY DRAWBAR

Attaches quickly, positively to pole end. Chain and tightener implant four studs firmly into pole.

EAGLE PORTABLE POLE BINDER

Bind poles, logs or pipe to trailer or truck with this handy, foolproof tool. Complete with 18 feet of 5/16" steel cable. Can be slacked or tightened at any time without danger of losing load.

EAGLE TYPE "CR" POWER REEL

Designed to pick up wire in neat, compact rolls. Attaches to winch shaft by means of pin and bayonet type socket. Quarter-turn of convenient handle collapses reel for removal of coil. Steel spindle, aluminum arms.

EAGLE STEEL POLE DERRICKS

Thirteen models, steel and aluminum. One-piece or telescoping side legs. Handles poles up to 70 feet long. Derrick head cable sheaves have self-lubricating bronze bushings. Cable guide rollers on derrick head prevent fraying or shearing winch cable.

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

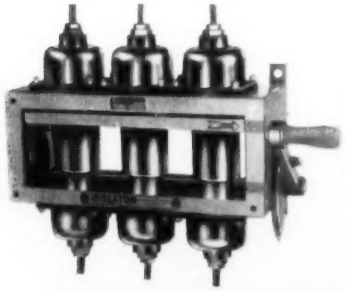
Distributed by Graybar ELECTRIC COMPANY

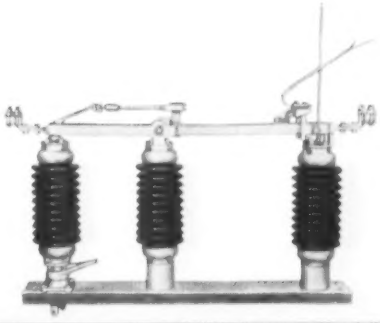
THREE E

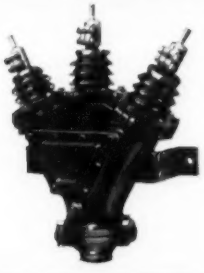
High Voltage Switches and Accessories

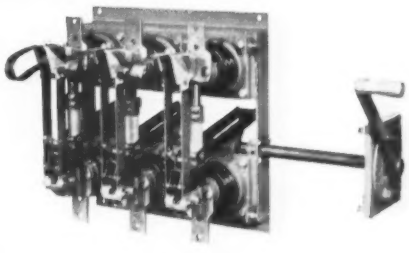
True efficiency in high voltage switchgear means packing a lot of reliability and convenience in compact, economical form.

These Three E products *are dependable* . . . each is solidly made of the best materials . . . each is backed by forty years of experience in high voltage engineering and manufacturing. Careful design has made them as compact and economical as a wide safety margin and their heavy duties will allow. Your assurance of Three E reliability is the thousands of units now at work wherever real *efficiency* is a must.









Detailed bulletins are available for any of these THREE E products

ELECTRICAL ENGINEERS EQUIPMENT CO.

MELROSE PARK, ILLINOIS

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA
GRAYBAR

Distributed by GraybaR

EVERSTICK ANCHORS

FOR TOUGH ANCHORING JOBS!

Today's anchoring jobs bring Eversticks to the forefront. They provide tight, safe anchoring . . . always in excess of rated capacities. Easy and quick to install . . . made of finest grade maleable iron with superior rust-resisting qualities and exceptional toughness. Every Everstick is plainly marked for ease of handling and storing.

AN EXCLUSIVE EVERSTICK FEATURE

The nut housing feature of the Everstick prevents rod from slipping thru while installing and provides a solid substantial base for the expanding blades.

There's a complete line of Eversticks for all strain requirements. 15 sizes of 2-way—3-way—4-way types.

EVERSTICK ANCHOR CO., Fairfield, Iowa

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

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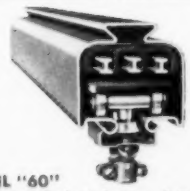
FEEDRAIL® Trolley Busways
Handy Selection Guide



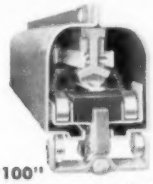
FEEDRAIL "60"
Applications: Budget hoists, light tonnage monorails, small portable tools, lighting, cutting and sewing equipment.

Capacity: Continuous current rating—60 amperes; 250 volts A.C. or D.C.; 2 or 3 pole.

Track: Plain, curved, door, sectionalizing and transfer sections.

Trolleys: 15 Amperes, fusible and non-fusible. New special service 20 ampere fusible and non-fusible trolleys for use with budget hoists and monorails. 8 ampere plug-in jacks for stationary service.

Additional data in Bulletin No. 45.



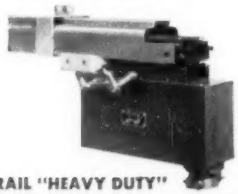
FEEDRAIL "100"
Applications: Cranes and hoists, portable tools, production and test lines, machine tools, airport hangar doors.

Capacity: Continuous current rating — 100 amperes; 575 volts A.C. or 250 volts D.C.; 2 or 3 pole.

Track: Plain, curved, door, sectionalizing and transfer sections.

Trolleys: 20 and 30 ampere fusible and non-fusible types, with and without receptacles, to meet a wide range of requirements. Non-fusible crane and hoist trolleys in 30, 60 and 100 ampere capacities.

Additional data in Bulletin No. 40.



FEEDRAIL "HEAVY DUTY"
Applications: Heavy duty cranes and hoists, large machine tools, conveyor assembly lines.

Capacity: Continuous current rating — 225, 375 and 500 amperes; 575 volts A.C. or 250 volts D.C.; 2 or 3 pole.

Track: Plain, door and expansion sections.

Trolleys: 225 amperes with bottom or side outlet.

Additional data in Bulletin No. 35.

Feedrail is the safe, dependable way to distribute electrical power to moving or stationary equipment.

The modern Feedrail Trolley Busways eliminate the problems and troubles of open wiring, accidental contact, and long trailing cables. All current-carrying components are protected by sturdy steel housings. Easy rolling trolley outlets, supported by the protective track housing, take off power from the bus bars at any point along the length of a run. There's no chance of broken conductors suddenly interrupting operation. The entire installation is compact, out of the way and trouble-free.

Track, trolleys and accessories are soundly engineered and built to high precision standards that mean long life. Its design includes every provision for fast, easy installation — maximum safety and dependability.

FOR FULL DETAILS write for descriptive literature. We can help you better if you state your requirements. Address Dept. Q-6.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

G4-1

ELECTRIC FEEDRAIL

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

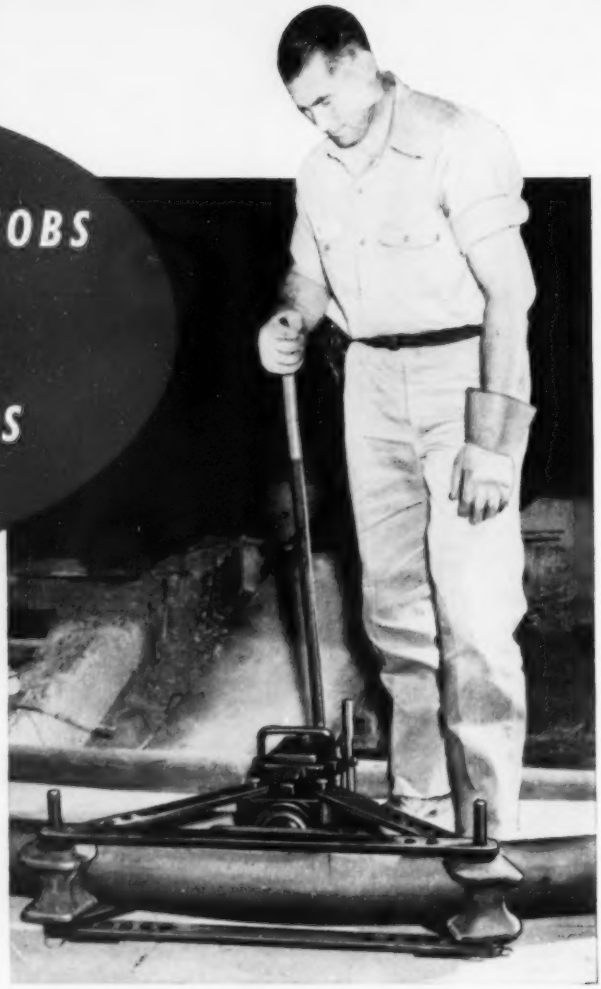
125 BARCLAY STREET • NEW YORK 7, N.Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

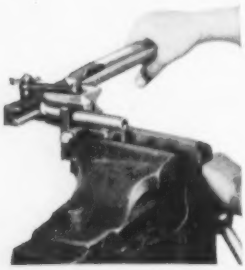
Distributed by GRAYBAR

CUT COSTS...SPEED JOBS WITH GREENLEE TIMESAVING TOOLS



Greenlee Hydraulic Conduit Bender

Conduit installations go far faster . . . neat, tailor-made jobs result every time with a GREENLEE Bender. Many owners report labor savings from 50% to 90% . . . and the cost of many manufactured bends and fittings is eliminated. For, with the GREENLEE, *one man* in but minutes makes smooth, accurate bends in pipe up to 5", rigid and thin-wall conduit, tubing and bus bars. Compact and portable, the GREENLEE Hydraulic Bender can be easily and quickly moved for *on-the-job bending* exactly where and when wanted! *Users say it often pays for itself on the very first job.*

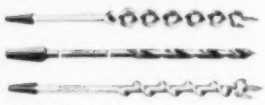


Hand Benders for Tubing

Swiftly produce accurate small-radius bends (up to 180°) in conduit, pipe and tubing. No flattening or kinks. GREENLEE Hand Benders are especially designed to form neat bends to fit sharp corners, nooks and other close quarters. Eliminates need for many manufactured bends and fittings. Various sizes and models . . . handy companion tools to GREENLEE Hydraulic Benders for quickly "custom making" your own complete conduit installations *right on the job.*

Knockout Punches and Hydraulic Punch Driver

Quick, easy way to make knockout enlargements for ½" to 4" conduit. Simply insert GREENLEE Knockout Punch in knockout or small drilled hole, then turn with an ordinary wrench. For an even faster, practically effortless operation, drive Punch with powerful, portable GREENLEE Hydraulic Driver shown below.



Boring Tools For quickly making clean, smooth openings for conduit and wiring. The GREENLEE line includes Electricians' Unispur and Solid-Center Auger Bits, Bell Hangers' Drills, Expansive Bits, and Bit Extensions.

Cable Puller Easy-operating, compact unit for 7,500 pound pull. Fastens directly to conduit for pulling in line with conduit . . . no loosened hangers. Attachment available for concealed conduit work.

SEE YOUR ELECTRICAL DISTRIBUTOR Get complete information on the above and other GREENLEE timesaving tools: Hydraulic Pipe Pushers • Joist Borers • Chisels and Gouges • Radio Chassis Punches • Angle-Screw Drivers • Spiral Screw Drivers • Automatic Push Drills • and many more. Greenlee Tool Co., 1806 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN
GREENLEE

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR ELECTRIC COMPANY

FOR HUNDREDS OF

STANDARD

SIZES

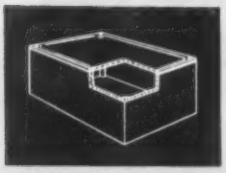
...PLUS COUNTLESS

CUSTOM

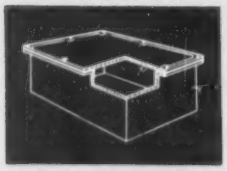
VARIATIONS

...CAST BOXES* BY HOPE

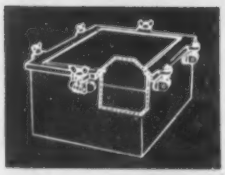
STANDARD TYPES & SIZES



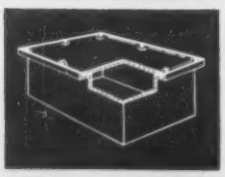
UNFLANGED BOXES
H1200 Type
164 sizes
from 4 x 2 x 2 to 48 x 36 x 17



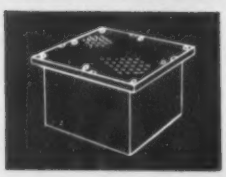
FLAT FLANGED BOXES
H8000 Type
87 sizes
from 4 x 4 x 3 to 36 x 36 x 12



HINGED COVER BOXES
H3200 Type
128 sizes
from 5 x 5 x 3 to 36 x 36 x 12



FLANGED RECESSED COVER BOXES
H7000 Type
51 sizes
from 4 x 4 x 3 to 30 x 24 x 12



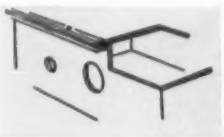
CHECKERED COVER SIDEWALK BOXES
H5800 Type
53 sizes
from 6 x 6 x 4 to 36 x 24 x 14

STANDARD BOXES are of strong, dense cast iron—hot dip galvanized for long service and attractive appearance. Weatherproof construction—rubber-gasketed closure prevents entry of rain, snow, sleet or dust under normal conditions.

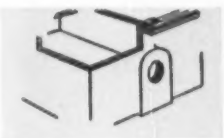
CUSTOM VARIATIONS

You can specify any of these modifications in standard BOXES by HOPE —have them factory-made at moderate cost—and get prompt delivery.

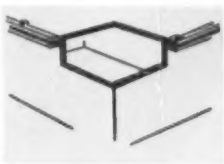
DRILLING—
or drilling and tapping—
of conduit entrances



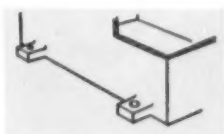
BOSSES—
to provide extra thickness
for five-thread conduit entrances.
Drilled and tapped to specification
if desired



SPECIAL GASKETS —
Neoprene for fungus resistance in hot, humid climates • pure gum for extreme softness and resistance to special acids • Vellumoid for resistance to oils and fats • graphite-free compressed asbestos for installation near boilers or steam pipes



MOUNTING LUGS—
drilled for any desired
bolt size



INTERIOR MOUNTING BUTTONS—
—tapped blind
to specified centers

AND . . . you can order these custom modifications, as well as standard BOXES by HOPE, conveniently and quickly, through your local electrical distributor.

*** OUTLET BOXES AND FITTINGS • JUNCTION AND PULL BOXES • HINGED CABINETS • TERMINAL BOXES • EXPLOSION HOUSINGS**

HOPE

ELECTRICAL PRODUCTS CO., INC.

338 Wilson Avenue, Newark 5, N. J., Mitchell 2-4426

EXPLOSION HOUSINGS BY HOPE

have been extensively used in Class 1, Groups C and D hazardous locations, such as chemical, petroleum and powder plants, pump rooms and paint plants.

GET THE FULL STORY ON BOXES BY HOPE —
WRITE ON COMPANY LETTERHEAD FOR CATALOG

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR ELECTRIC COMPANY

Extra STRENGTH BEAUTY

WITH HAPCO *Aluminum Alloy* BRACKETS AND STANDARDS

This 10-inch diameter pole at a corner location harmonizes with the regular smaller diameter standards, yet has the extra weight and strength required.

An Indiana city found a happy solution to its street lighting problems in Hapco Aluminum Alloy Standards and Brackets. Dead end and corner locations are provided with poles of larger diameter and greater weight, with the same design features as the other standards.

Extra Strength . . . The Hapco method of production offers a desirable versatility in providing the poles required for heavy duty or special services while still maintaining the harmonious beauty of the system.

Extra Beauty . . . All Hapco Standards are Venetian column type acclaimed by architects for eye appeal and strength. Every pole is one piece, free from longitudinal seams or transverse joints, and is of uniform wall thickness throughout. Standards and brackets are mat finished for permanent beauty without maintenance or painting cost.

The lighting system in the business section is beautiful by day as well as by night, thanks to Hapco graceful standards and brackets in permanent aluminum alloy.

HUBBARD ALUMINUM PRODUCTS COMPANY

MANUFACTURERS OF HAPCO QUALITY ALUMINUM PRODUCTS

A Division of HUBBARD and COMPANY

6301 Butler Street • Pittsburgh 1, Pa.

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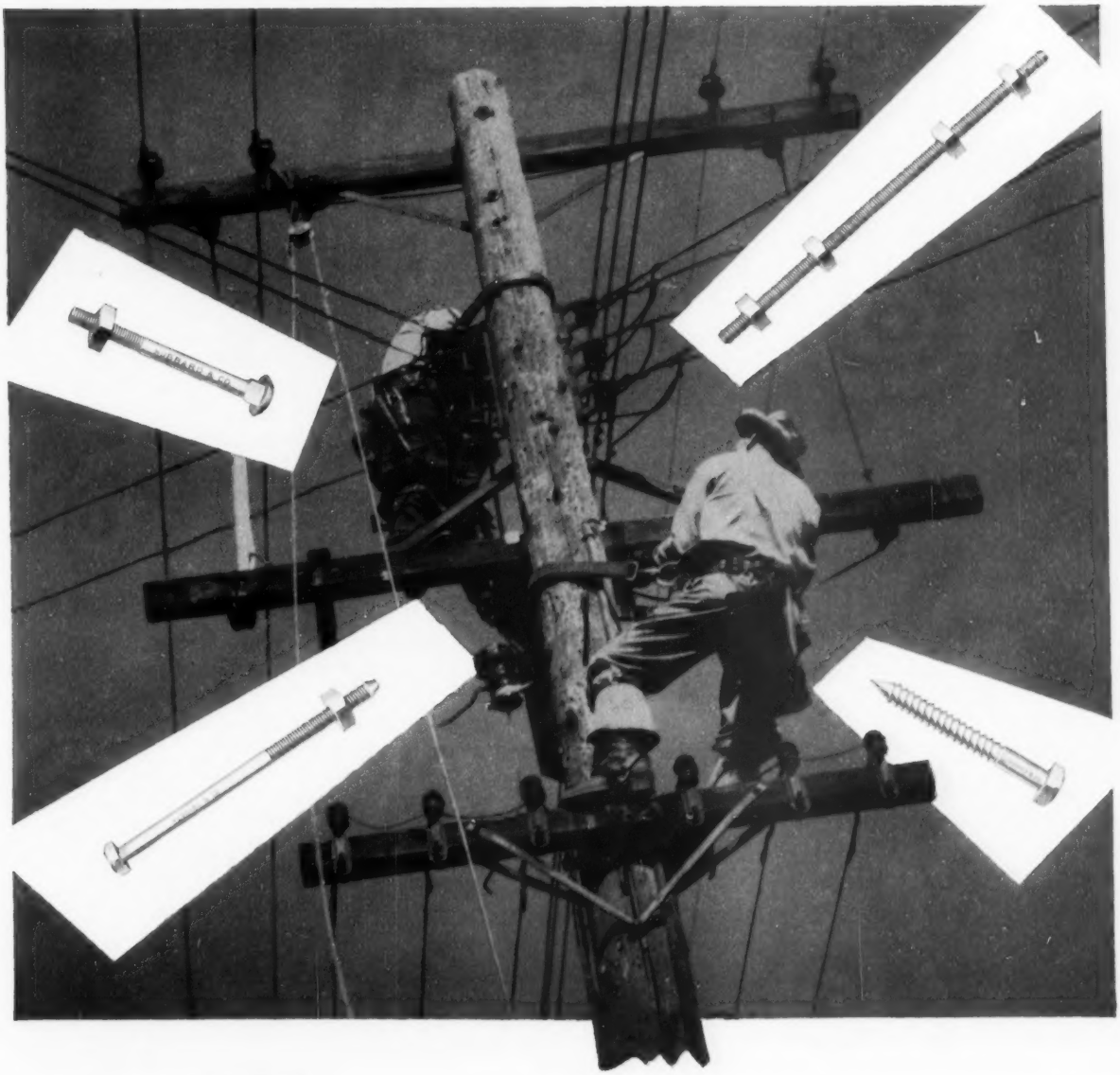
Distributed by Graybar Electric Company

HOLD EVERYTHING!



with HUBBARD Hardware

Machine bolts, carriage bolts, double arming bolts, and lag screws—the workaday items of the electrical industry—are specially designed by Hubbard with careful attention to the functions which they must serve.

All crossarm and double arming bolts have the original Hubbard DRIVEPOINT feature. All bolts and lag screws are formed from new open hearth steel and are Hubbard Double-Dip Hot Galvanized. Special care is used to keep threads clean and smooth during galvanizing.

If it's Hubbard, it's made to serve efficiently.

HUBBARD AND COMPANY

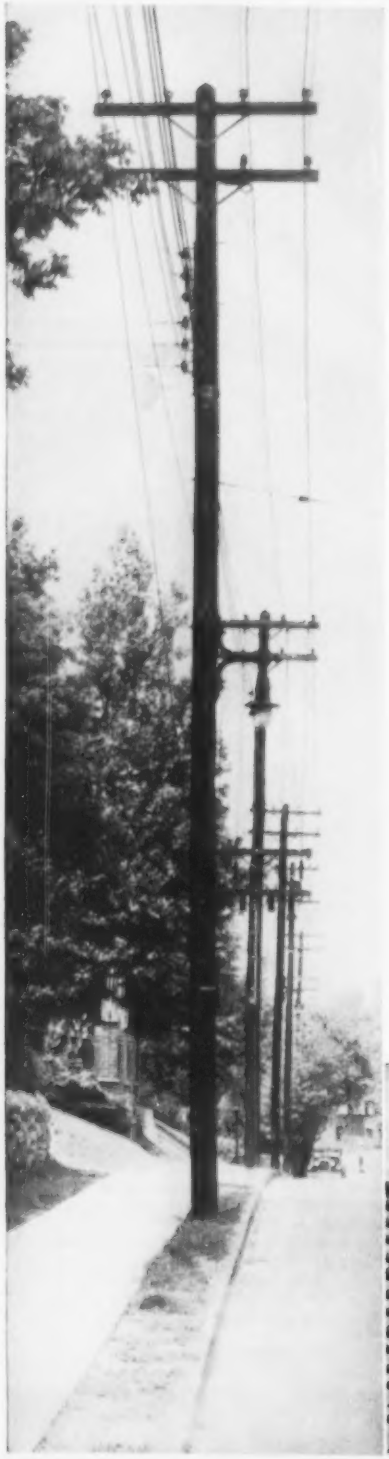
ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

DEPENDABLE Poles of Selected Sound Timber Scientifically Treated



THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 75 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

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HUBBELL

Twist-Lock
TRADE-MARK

3 and 4-WIRE ELECTRICAL *LOCKING* CONNECTORS

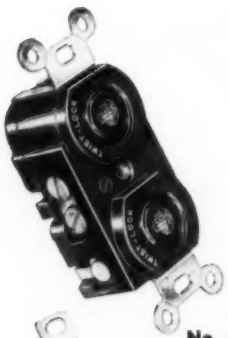
FIRST AND STILL THE *FINEST*

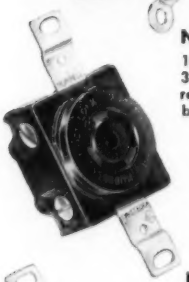
No. 7313
20 amp.

No. 7311
20 amp.

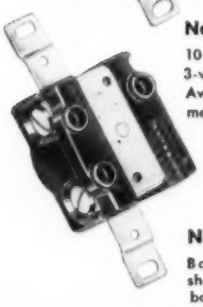
Nos. 7311 and 7313 RATED
20 AMP., 250 Volts AC or DC;
10 AMP., 600 Volts AC

For Greater Convenience, Safety and Efficiency in the Operation of Motor-driven Tools or Portable Electrical Apparatus.

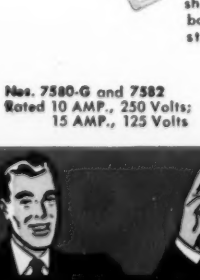




No. 7580-G
10 ampere Twist-Lock 3-wire grounded duplex receptacle available for back or side wiring.



No. 7582
10 ampere Twist-Lock 3-wire single receptacle. Available grounded to metal strap on request.



No. 7582
Back view of unit shown above indicating back wiring holes and sturdy construction.

Nos. 7580-G and 7582
Rated 10 AMP., 250 Volts;
15 AMP., 125 Volts

NEVER DISCONNECTS ACCIDENTALLY

When converting from 2-wire to 3 or 4-wire systems . . . to increase electrical capacity—for safety—for system modernization—or for grounded protection . . . it makes good sense to select a device which is known to have ruggedness, dependability, and long life. *Hubbell Twist-Lock is your logical first choice.* 3 and 4-wire Twist-Lock sizes are available grounded and not grounded.

All Graybar branches carry a complete stock of Hubbell Twist-Lock, Hubbellock and straight blade wiring devices. Service is as close as your telephone.

Write for Twist-Lock folder which illustrates the complete line.

Highest Grade
HEAVY DUTY
WIRING HUBBELL DEVICES

HARVEY HUBBELL, INC.
BRIDGEPORT, CONN.

12HH84

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Graybar Distributed by Graybar

maintain an

"Air of Efficiency"

with

ILG

PROPELLER FANS

• faster air change • minimum maintenance

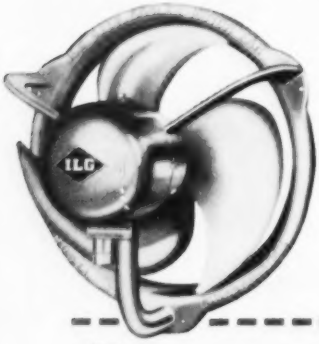
• lower power costs

Efficient operation calls for efficient ventilation . . . ILG ventilation! Equipped with self-cooled motors, Ilg Propeller Fans assure you longer, trouble-free, dependable performance. Rated and certified under standard testing codes, you can count on Ilg Fans to move more air. Dynamically balanced fan wheel, direct-connected to motor, assures smooth, quiet, free-running operation. And Ilg's famous "one-name-plate" guarantee covers both fan and Ilg-built motor as a unit.

You can choose an Ilg Fan from a complete range of sizes . . . 6" to 72". And you can expect fast delivery, too, because adequate stocks of Ilg Fans are maintained everywhere. You'll find experienced ventilating experts in all principal cities . . . ready and able to solve your air-moving problems. See your dealer, or write . . .

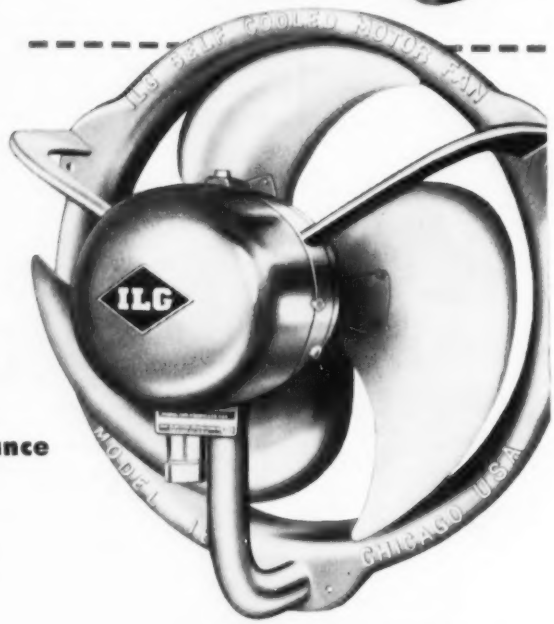
ILG ELECTRIC VENTILATING CO.

2850 N. Pulaski Road, Chicago 41, Illinois

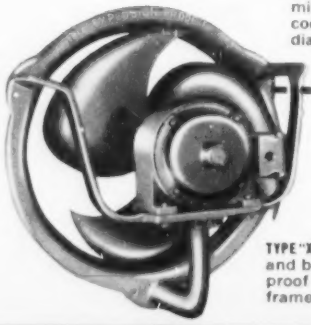


TYPE "P"—high speed, maximum air volume within minimum dimensions. For use on systems up to .6" static pressure. Self-cooled motor. 4 sizes.

TYPE "W"—for large diameter wheels, 60" to 72" sizes. Dynamically balanced wheel. Rigid, sturdy frame. Self-cooled motor.



TYPE "Q"—powerful, quiet, efficient . . . plus long life, minimum maintenance. Self-cooled motor. 6" to 48" diameter wheels.



TYPE "X"—has TYPE "Q" wheel and ball bearing, explosion-proof motor. Non-ferrous frame. 16 capacities.

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

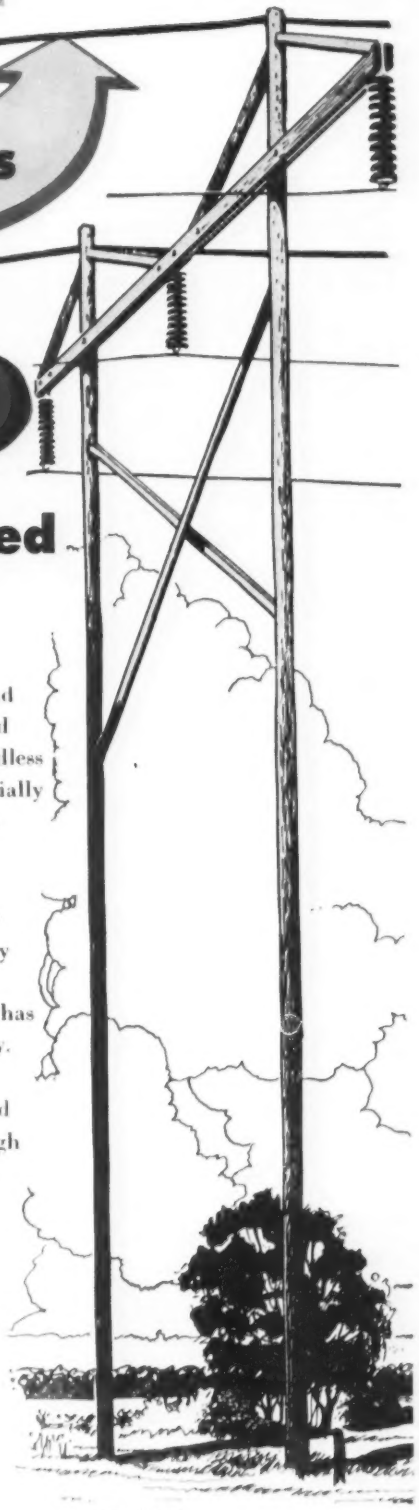
Distributed by GRAYBAR ELECTRIC COMPANY

FOR THAT *Extra Safety Factor* IN

Overhead Ground Wires

Specify **Crapo**

Weldless Galvanized STEEL STRAND



To obtain maximum strength and dependability in overhead ground or static wire, specify *Crapo* Weldless Galvanized Steel Strand. This 7-wire steel strand, designed especially for shielding power transmission lines against lightning, is made in continuous lengths without welds or joints of any kind either in the individual wires or in the finished strand.

Crapo Weldless Galvanized Steel Strand combines *all* of the tensile strength inherent in steel with a ruggedness and durability which make it the most practical and economical overhead ground wire. Because of its superior physical characteristics, it has a high fatigue endurance limit, provides a greater factor of safety.

Like all *Crapo* galvanized steel strand, it is manufactured to highest quality standards and in conformity with latest approved specifications. *Crapo* Weldless Steel Strand is available through Graybar Electric Company in the sizes and grades best adapted for use as overhead ground wire.

Ask your Graybar representative for a copy of this booklet containing Sags and Tensions for Crapo Galvanized Steel Strand where used as overhead ground wire — or write for Booklet OG-25!

INDIANA
Steel and Wire Company
MUNCIE, INDIANA

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Graybar Distributed by GraybaR

THEY'RE PUNCTURE PROOF!

If it's on the pin, it's in service!

No more searching for defective insulators when your lines are protected with NEW Kimble *Tempered* Glass Insulators.

Why? Because these new insulators are puncture-proof. Exhaustive laboratory tests at values far in excess of A.I.E.E. standards have proved it impossible to puncture a Kimble *Tempered* Glass Insulator in air—*even under voltage impulses far above normal service rating*. Four years of field testing on more than 500 miles of line have produced no puncture failures. Even lightning surges have failed to damage these new Kimble *Tempered* Glass Insulators.

In the event of shattering due to severe mechanical shock, insulator disintegrates into small non-sharp fragments. Trouble shooters can locate broken insulator—fast.

What's the secret? *Tempering*, a Kimble development in glass that adds a new element to the many natural virtues of glass. It's an exclusive Kimble production method that gives Kimble insulators a hard-compression surface layer that makes them strong enough to meet the severe tests required.

Why not see how *tempered* glass can cut your line maintenance costs. Write for descriptive folder. Address: Kimble Glass Company, subsidiary of Owens-Illinois, Dept. EW6, Toledo 1, Ohio.

KIMBLE INSULATORS
AN (O) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO

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It Pays to have the Right Equipment

Pike Poles

Pike Pole Guards

Pole Supports

Tamping Bars

Spoons

Reels

Tree Trimmers

E-Z-Up Pole Cradle

Folding Barricades

OSHKOSH

POLE LINE TOOLS

LEACH COMPANY • OSHKOSH, WISCONSIN

Since 1887

Write for full line catalog

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MERCOID®
CONTROLS
FOR INDOOR, OUTDOOR OR EXPLOSIVE ATMOSPHERES

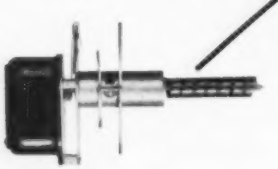
DIFFERENTIAL PRESSURE CONTROLS
For High Pressures

PRESSURE CONTROLS
30" Vac. to 2500 P.S.I.

DIFFERENTIAL PRESSURE CONTROLS
For Low Pressures

REMOTE STEM TEMPERATURE CONTROLS
For Temperatures—30° to 530°

TRANSFORMER-RELAYS
Single and Multiple Circuits



AIR TYPE TEMPERATURE CONTROLS
For Temperatures To 650°

LIQUID LEVEL CONTROLS
With Packing Gland Or Torque Rod Construction

For Protection Against
Explosive Atmospheres, Weather, Vapors

APPLICATION: Mercoid Controls are adaptable to a wide range of applications involving the control of pressure, temperature, liquid level or mechanical movement.

ELECTRICAL CONTACT: Mercoid Controls incorporate sealed mercury switches which are impervious to dust, dirt and corrosion. These switches can give a million operations without deterioration.

CIRCUIT ARRANGEMENTS: There are any number of special circuits available to meet your particular problem.

OPERATING RANGES—SENSITIVITY: Mercoid Controls are available in many ranges with the sensitivity your application requires.

CONSTRUCTION: Standard type instruments are furnished with steel case. Special cases and housings are available for protection against weather, excess vapors, splashing or explosive atmospheres.

If you have a control or mercury switch problem send details to our engineering department.

Write for Catalog No. 700B

THE MERCOID CORPORATION, 4201 BELMONT AVE., CHICAGO 41, ILLINOIS

NEW YORK, 205 EAST 42nd STREET PHILADELPHIA, 3137 N. BROAD STREET

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NEW

No. 53-XPJ Nicopress Tool with *Three Grooves*

Accommodates Nicopress Sleeves

FOR COPPER

1 solid, 1 seven strand, 2 solid, 2 seven strand, 2 three strand, 3 solid, 4 solid, 4 seven strand, 4 three strand, 6 solid, 6 seven strand, 8 solid, 8 seven strand, 3 No. 10, 3 No. 8.

FOR COPPERWELD

4A, 6A, 8A, 6C, 8C, 6D, 8D, 9½D, 3 No. 10, 3 No. 12, 4 solid, 6 solid, 8 solid, 10 solid.

FOR ALL-ALUMINUM

2 solid, 2 seven strand, 4 solid, 4 seven strand, 6 solid, 6 seven strand, 8 solid.

FOR AMERDUCTOR

8SCP or SCG, 10SCP or SCG, 12SCP or SCG.

Write for descriptive folder.

Nicopress Sleeves and Tools Patented in U. S. and Foreign Countries. "Nicopress" Registered in U. S. and foreign countries.

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.: N. SLATER CO., LTD., HAMILTON, ONTARIO, CANADA

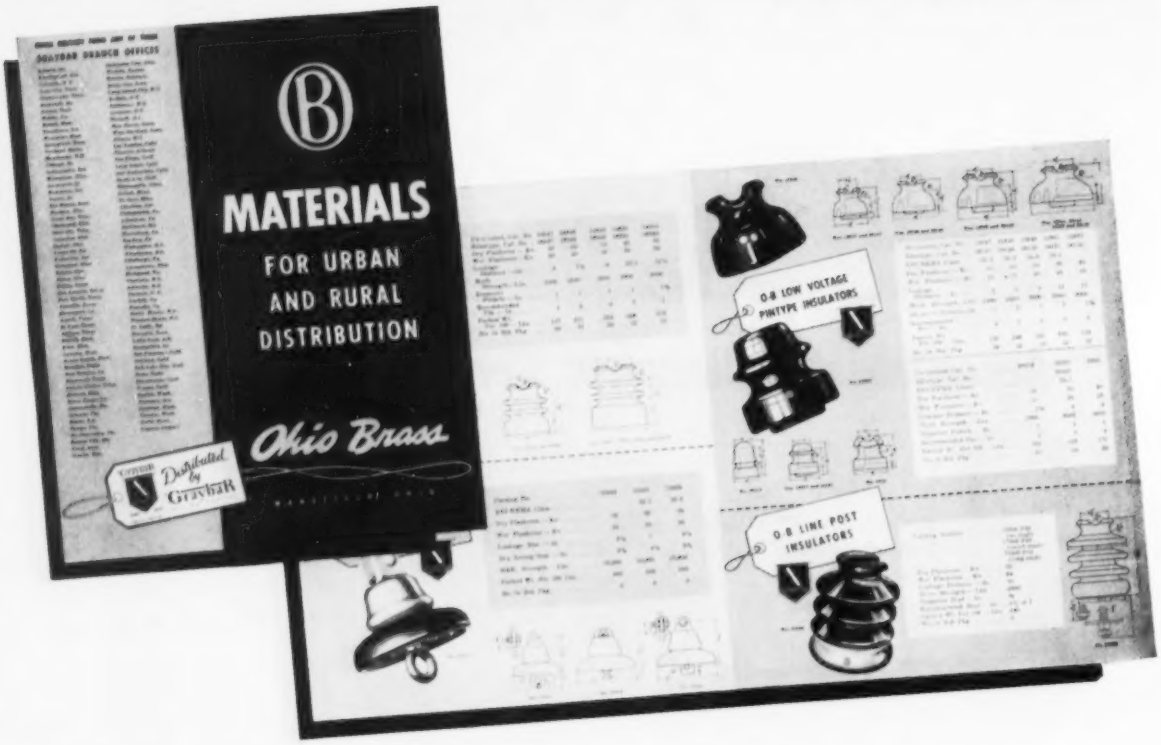
Export Distributor: INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR

Everything between the crossarm and the conductor



Ohio Brass Company products for distribution line construction include:

PINTYPE INSULATORS

LINE POST INSULATORS

KINGPIN INSULATORS

SUSPENSION INSULATORS

SPOOLS AND CLEVISES

STRAIN INSULATORS

STRAIN AND DEADEND CLAMPS AND HARDWARE

O-B Insulators and Hardware Suit Every Distribution Job

Ask your Graybar man for the O-B booklet listing materials for urban and rural distribution lines. Complete information at your desk makes ordering simple, specific. You can rely on Graybar to have the O-B materials you need on hand, and ready, at the latest, for overnight delivery at the point you specify.

When you come to depend on Graybar for stocking and delivery service like this, you'll find that the load on your own store-keeping facilities decreases. Take advantage of these adequate stocks of distribution materials without having to keep them in your inventory!

Ohio Brass

MANSFIELD OHIO, U. S. A.

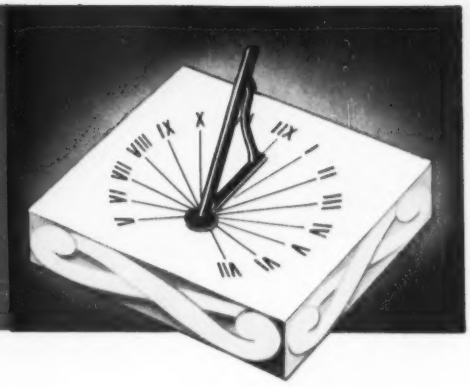
4490-H

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by GRAYBAR ELECTRIC COMPANY

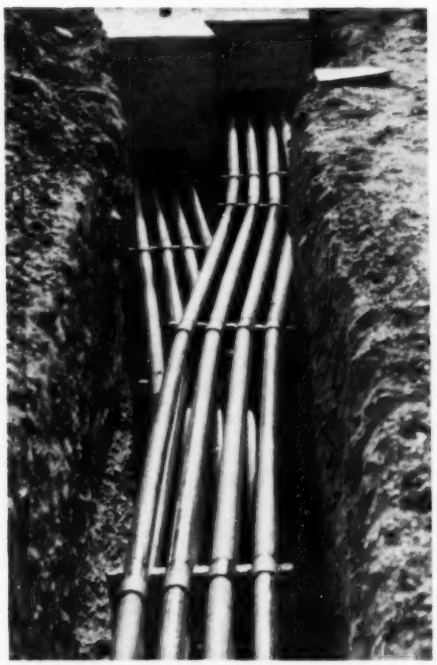
QUALITY

...proved by TIME...



Convincing proof of Orangeburg's enduring quality is its 60 year record of service to leading Public Utilities, Municipalities and Contractors.

Quality stands out in every feature. Orangeburg Fibre Conduit is lightweight yet strong, tough and resilient. Its impermeable walls and tight joints keep out corrosive ground waters. Its smooth bore and low coefficient of friction protect cable sheaths from abrasion. Orangeburg material resists acids, alkalies, salt, grease and oil.

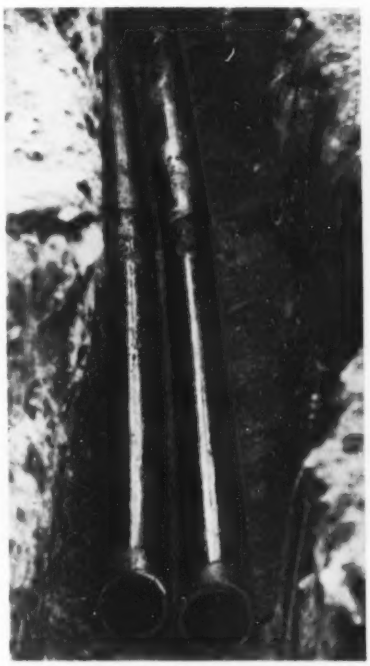


ORANGEBURG STANDARD is installed with concrete encasement. Preferred for banks of three or more ducts.

For these and many other advantages Orangeburg Fibre Conduit provides complete protection for the expensive underground cables. With no interruption of the power the communications continue to flow year after year.

SAVES MONEY, TOO!

Design engineers specify Orangeburg Fibre Conduit because it saves by prolonging cable life . . . saves by faster handling and laying, saves by the use of Orangeburg's standard fittings which cut costs and simplify installations. Send to Dpt.EW-64 for more facts.



ORANGEBURG NOCRETE is installed without concrete encasement. Extra heavy wall for direct burial.

ORANGEBURG MANUFACTURING CO., INC., Orangeburg, New York • *West Coast Plant — Newark, California*

ORANGEBURG FIBRE CONDUIT

STANDARD INSTALLED WITH CONCRETE

NOCRETE INSTALLED WITHOUT CONCRETE

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

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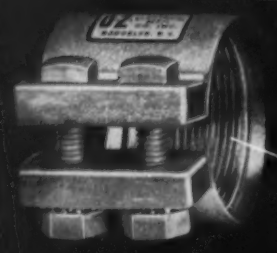
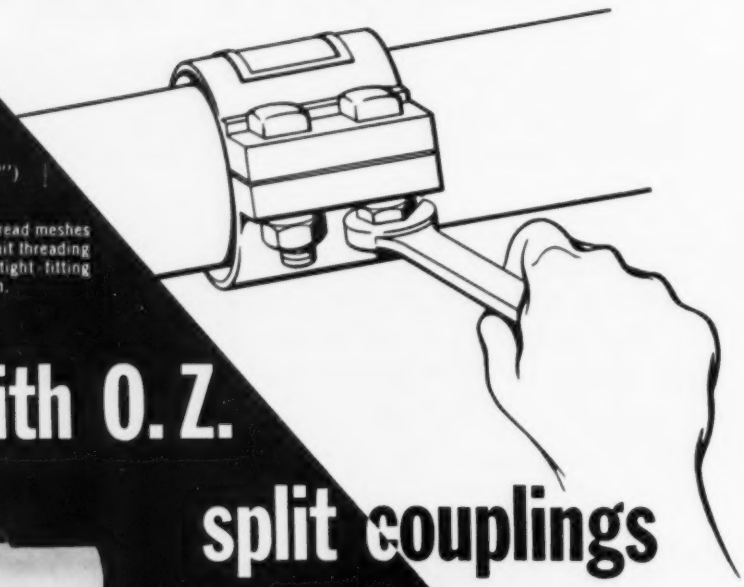
*"TOUGH" conduit coupling jobs

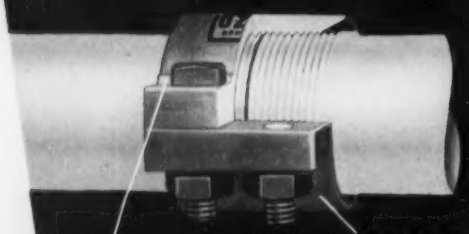


(Type "SP")

Interior thread meshes with conduit threading for rigid, tight-fitting connection.



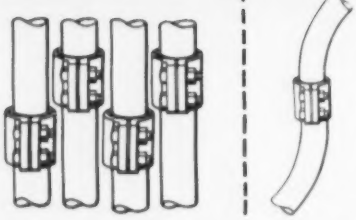
are easy with O. Z. split couplings



Bolt heads are held in place by shoulder on coupling, eliminating need for second tool.

One piece malleable iron construction facilitates handling during installation.

To install, simply slip over one conduit end, butt ends of both conduits, slide fitting back into position and tighten nuts.



* **"Tough"** — (Where ordinary couplings can't be installed). Are clearances close — near floor, wall, ceiling or other obstructions? Can conduits be turned due to bends? Is space or accessibility a factor? Just install an O. Z. Type "SP" Split Coupling.

Butt the conduit ends within the O. Z. Split Coupling — tighten two nuts with an ordinary open-end wrench and presto . . . you have a permanent, close-fitting, rigid connection.

Drastically reduced installation costs, plus initial savings of as much as 50% in larger sizes, over similar competitive fittings, are just two of the many reasons why you should specify O. Z. Split Couplings for your difficult conduit coupling jobs.

Call your local O. Z. distributor . . . he is ready to make immediate delivery from stock on sizes from ½" to 5".

O. Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND ST. • BROOKLYN 17, N.Y.

CAST IRON BOXES • SOLDERLESS CONNECTORS
CABLE TERMINATORS • GROUNDING DEVICES
POWER CONNECTORS • CONDUIT FITTINGS

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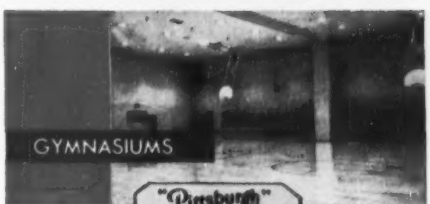
WILKINSBURG HIGH SCHOOL
Wilkinsburg, Pennsylvania
Architect: Sarber & Hasno
Elec. Engineers: H. Lentz
Elec. Contractor: Martin & Murray

PERFECT GRADE

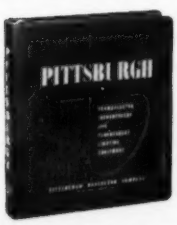
IN EVERY ASSIGNMENT

with PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT



If a school's lighting were graded by standards as exacting as those applied to its students, most schools would "flunk" in meeting the accepted levels for classroom illumination.

Good lighting is an important tool of education; visual ease contributes much to proficiency in learning. That's why schools like the Wilkinsburg High School select Pittsburgh Permaflector Lighting Equipment. This line gives the right Fluorescent and/or Incandescent lighting needed for each individual teaching area.



The Comprehensive Handbook for Lighting

"Must reading" for men engaged in lighting! 116 pages of data covering fluorescent and incandescent lighting equipment for all types of installations!

Write on your letterhead

PITTSBURGH REFLECTOR COMPANY

408 OLIVER BUILDING PITTSBURGH 22, PENNSYLVANIA

Permaflector Lighting Engineers in All Principal Cities

"Pittsburgh" Permaflector

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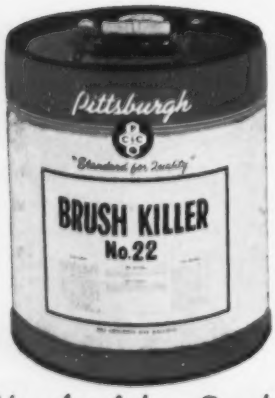
FOR SAFER, LONGER-LASTING BRUSH CONTROL—

Pittsburgh BRUSH KILLER No. 22



Standard for Quality

CLEARING brush from power line rights-of-way by hand or machine-cutting methods is costly, time-consuming and only temporary, at best. But you can do the job right the first time —and do it easier, safer and far more economically when you spray with *Pittsburgh* Brush Killer No. 22. Here's why:

EASIER—*Pittsburgh* Brush Killer No. 22 greatly simplifies your rights-of-way clearance problem. One crew of few men can kill more brush in hours than a dozen men can kill in days by hand. And the brush is killed right down to the roots.

SAFER—*Pittsburgh* Brush Killer No. 22 contains the highly effective low volatile Isooctyl ester that minimizes vapor drifts and possible damage to nearby crops. And it does not affect grass growth.

MORE ECONOMICAL—With *Pittsburgh* Brush Killer No. 22, you can clear your rights-of-way at far less cost per mile than by hand or mechanical methods. And cleared rights-of-way enable your maintenance crews to cover more miles per day, with savings in labor and equipment. ● Write today for complete details on *Pittsburgh* Brush Killer No. 22.

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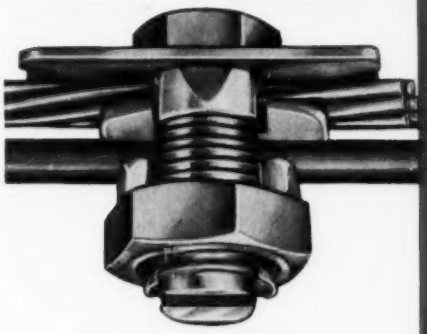
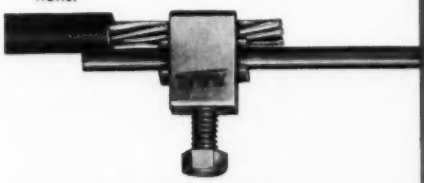
RELIABLE ALUMINUM CONNECTORS



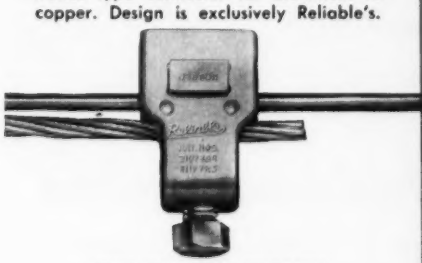
SPLIT BOLT—ALUMINUM

Bolt and nut are high strength aluminum alloy. Pressure bar may be tinplated copper. Reliable's catalog offers a full selection of accessories to fulfill the various specifications for spacers, armor plates, etc. as related to wire combinations.



SERVICE ENTRANCE CONNECTORS

Extruded aluminum body, slotted aluminum screw and two true bi-metal spacers make a technically correct service entrance type connector for aluminum to copper. Design is exclusively Reliable's.



FLIP-ON TAP CLAMPS

This design, exclusively Reliable's, already has nearly twenty years of trouble-free use to recommend it. Pressure ratio is 1 : 1. See Reliable's catalog for assorted applications.

COMPRESSION SLEEVES

For aluminum-to-copper service connections where compression tool joints are preferred. Reliable offers an aluminum sleeve with plated copper insert; the entire sleeve internally coated with just the right amount of inhibitor compound. Standard "P" die groove does all jobs on 4 and 6 aluminum sol., str. or ACSR to 4,6 or 8 copper.

Reliable COLD FORGED CONNECTORS

ARE PRECISELY MADE WITH PRECISION DIES! . . .

Critical dimensions are best held to close tolerances when tough silicon bronze is formed and embossed by cold, hard tool-steel . . . when the tools themselves are maintained accurate to minute tolerances.

Constant pressure on conductors is directly related to strength plus close thread engagement. Reuse following high torques is dependent upon original quality and precision (points 3 and 4). Pressure bar and slot tolerances (points 1 and 2) must be held just free of bind.

Reliable Split Bolt Connectors test for pressure, torque and strength well in excess of standards.

Reliable's forged connectors are listed under re-examination service, Underwriters' Laboratories.

Reliable **ELECTRIC COMPANY**

3145 Carroll Avenue, Chicago 12, Illinois

Over 45 years service to the utilities

POWER LINE CONNECTORS AND CONSTRUCTION SPECIALTIES

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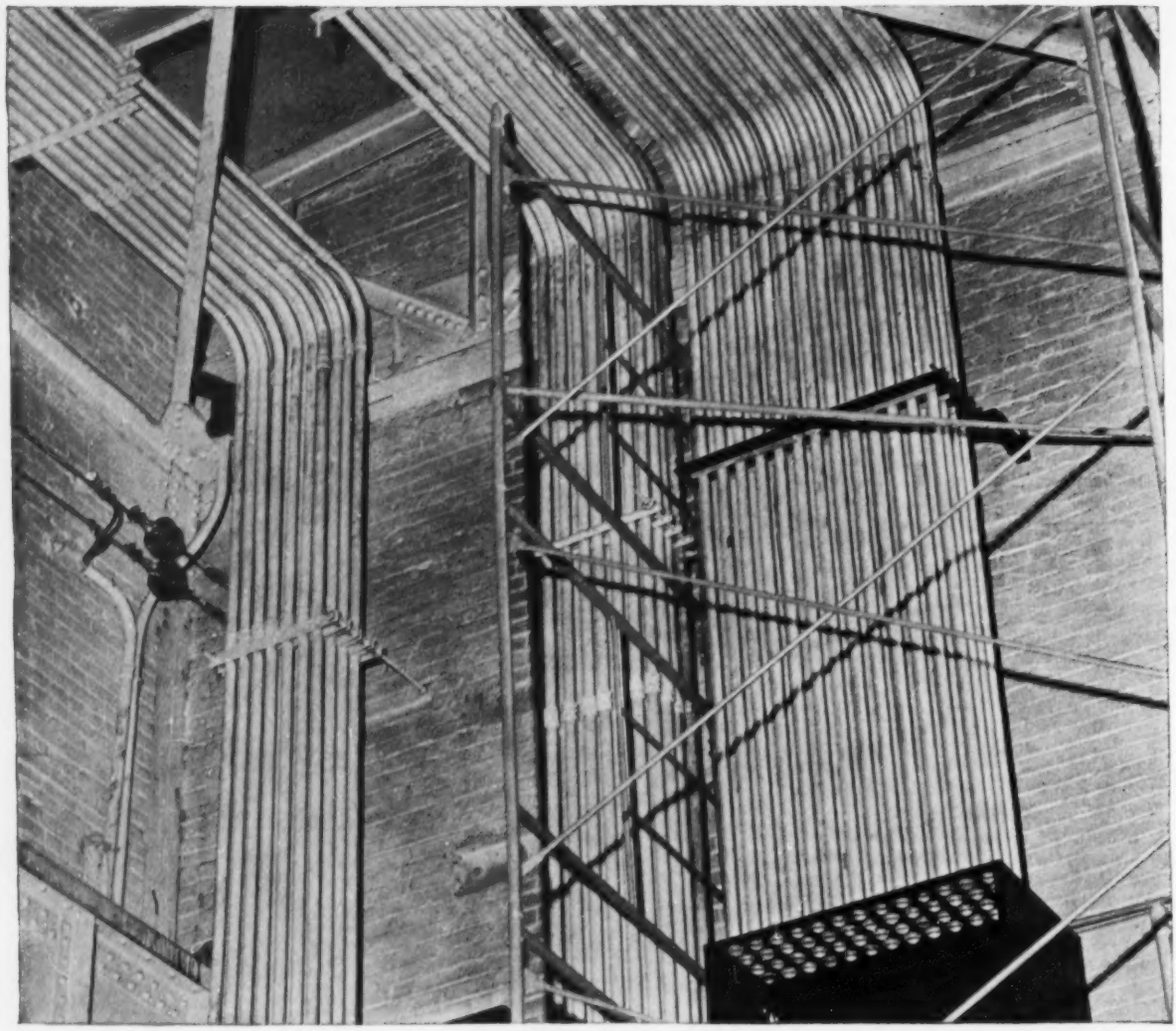

It pays to make a good investment twice

Twenty years ago, Iowa-Illinois Gas and Electric Co. put some wiring in Republic E.M.T. It's still on the job.

That's one big reason why control wiring in the company's new 69kv substation at the Moline Generating Station is also in Republic E.M.T. Both are considered good investments. Not only by Iowa-Illinois, but by many other utilities with a reputation for dependable service.

Whether you're building, or revamping, you should get all the facts about Republic E.M.T. It's the original threadless rigid steel electrical raceway. With no threads to cut, the galvanized zinc coating remains unbroken. Ductility makes possible 90 degree bends, with surface smooth and unwrinkled, inside and out. It's lighter. And with less weight to handle, installation costs are lower.

Consider using Republic E.M.T. It's the only "Inch-Marked" electrical raceway. And it's produced to A.S.A. Specification C80.3. Approved by Underwriters' Laboratories. Write for Booklet SA-54.

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
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GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Made by the Producers of ELECTRUNITE . . . The Original Electric Welded Boiler Tube

REPUBLIC STEEL
REPUBLIC ELECTRUNITE E.M.T.
"INCH-MARKED" THE MARK OF QUALITY

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SYMBOL OF OUTSTANDING QUALITY

Angle Type Plugs and Receptacles
Combination Switches and Pilot Lights
Ever-Lok Plugs and Receptacles
Unilarm Signal Alarms
...TO THOSE WHO SPECIFY, DISTRIBUTE, SELL OR USE ELECTRICAL EQUIPMENT
FS Switches Plugs and Receptacles
Circuit Breakers
Vaportight Lighting Fixtures
Explosion-Proof Lighting Fixtures
Dust Lighting Fixtures

Many electrical equipment items today look quite similar, have standardized ratings and specifications . . . but there is one important variable of value — QUALITY!

More and more, engineers, architects and others concerned with specifying electrical equipment, write "R & S Quality" into specifications. Increased numbers of contractors, electricians, distributors and others who sell R & S quality at the point of sale, see convincing evidence of its effect on customer satisfaction and repeat business. Industry, as the user of over 5000 R & S electrical equipment items, has discovered that this quality means complete electrical dependability and long service life.

All these advantages are symbolized by this well-known Russell and Stoll registered trade-mark. It is emblematic of over 50 years of specialized experience, sound engineering design, finest materials and precision manufacture.

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RUSSELL & STOLL

PRECISION-BUILT ELECTRICAL EQUIPMENT—SINCE 1902

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It's Fun to Be FIRST!

Even though Simplex has proudly announced many "Firsts," somehow the thrill never wears off. That's why we're so proud of our latest "First," announced last fall. It is the approval by the Underwriters' of Simplex WD-75 Wire as "Type RHW." It is the first wire to bear this approval.

Obviously a new product should do something for you that an old one doesn't do. Here's what Simplex WD-75 Wire will do:

- It can be used as general-purpose wire in BOTH wet or dry locations at a copper temperature of 167° F. (75° C.). No wire was approved to do that before.
- Depending on the ambient temperature, Simplex WD-75 can carry from 18 to 52% more amperes in the same size conductor in wet locations than Type RW Wire. That's good — saves you money, too.

Simplex WD-75 is gentle with remodeling costs, too. If your conduits are filled now to their rated capacity, and if additional amperes are needed, *don't* tear out your conduits. You need only pull out your present wire and pull in Simplex WD-75.

Simplex makes Type RHW Wire as ANHYDROPRENE WD-75 for use in conduits and ducts, and ANHYDREX WD-75 for direct burial in the ground. Simplex folder No. 1018 has more details about this wire. Why don't you write for it today?

Simplex **ANHYDROPRENE WD-75**
ANHYDREX WD-75

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

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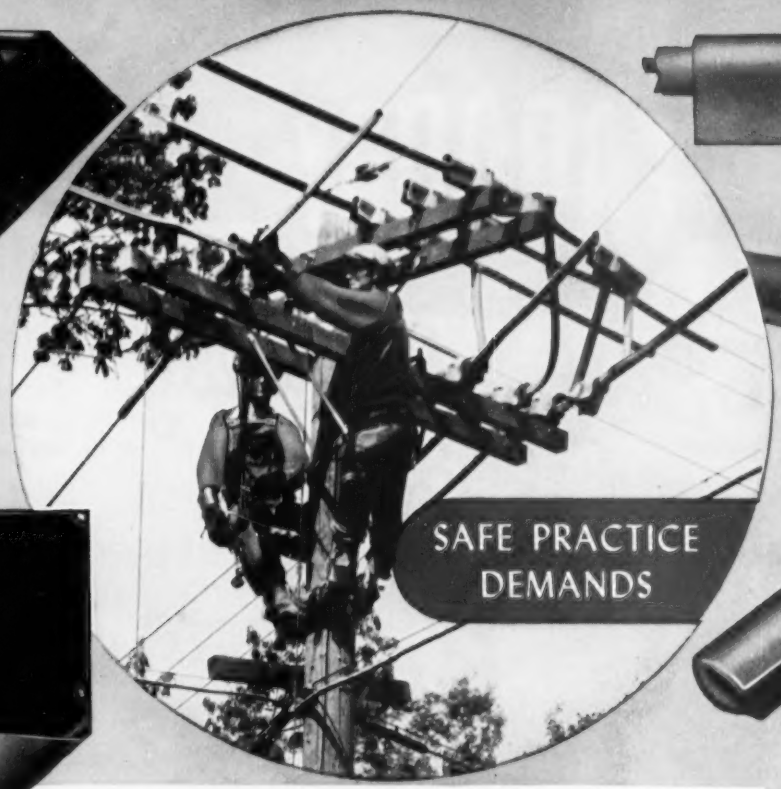
A DEVICE FOR EVERY ELECTRICAL HAZARD



SALISBURY

RUBBER PROTECTIVE DEVICES

• For linemen and others who work on or near energized equipment . . . Approved by safety engineers from coast to coast...Adopted for safety by public utility companies everywhere . . . Designed for maximum dependability and convenience in use . . . Made from highest grade materials by the pioneers in manufacture of rubber protective equipment for linemen . . . *Write for Catalog L-4.*

W. H. SALISBURY & CO.

GENERAL OFFICE AND FACTORY
401 NORTH MORGAN STREET, CHICAGO 22

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FARADAY®

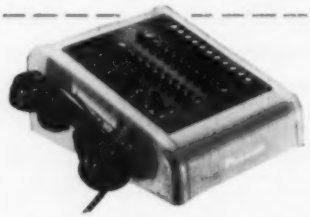
the Emblem of Quality since 1875

Electrical Signals and Systems

UNIPACT SIGNALS. Need one—or a series of bells, chimes, buzzers or horns? You can have your choice, because these various types of signals are interchangeable; no new wiring is needed. UNI-PACT Signals meet noise level requirements with tailor-made results.

FARADAY FIRE ALARM SYSTEMS. FARADAY Fire Alarms provide *extra* protection. A wide variety of systems to meet all fire warning requirements. Models available for surface or semi-flush installations. FARADAY is known for dependability throughout the industry.

FARADAY CLOCKS. Can be furnished for remote control by master units, or for direct-operating installations. FARADAY models, with exclusive plug-in feature, are supplied for surface, double-dial or flush mounting, in 10, 12 and 15 inch sizes. Easy-to-read dials are white, with bold Arabic numerals.



FARADAY PHONACALL STATION CONTROL UNIT. Features complete volume control, for both talking and listening. Push-button control. Equipped with both audible and visual signal. Compact design. Uses minimum desk space. Distinctive, durable, hammer-tone gray finish.

CONSULT YOUR NEAREST GRAYBAR BRANCH FOR COMPLETE DETAILS.

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CONSOLIDATED BY:

SPERTI FARADAY INC.

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BELLS • BUZZERS • HORNS • CHIMES • VISUAL AND AUDIBLE PAGING DEVICES AND SYSTEMS

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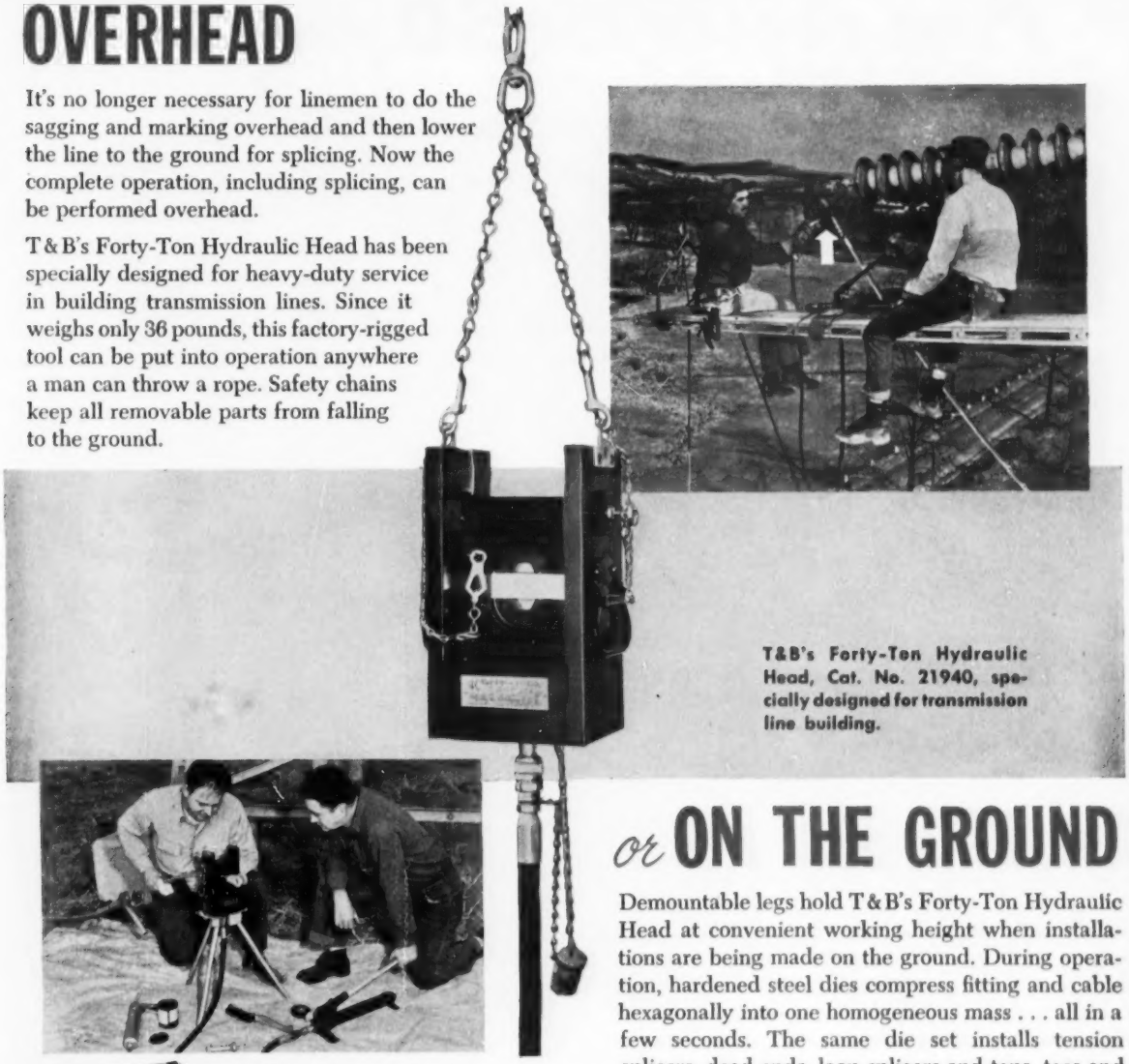
Now *ONE* portable tool makes transmission line splices

OVERHEAD

It's no longer necessary for linemen to do the sagging and marking overhead and then lower the line to the ground for splicing. Now the complete operation, including splicing, can be performed overhead.

T & B's Forty-Ton Hydraulic Head has been specially designed for heavy-duty service in building transmission lines. Since it weighs only 36 pounds, this factory-rigged tool can be put into operation anywhere a man can throw a rope. Safety chains keep all removable parts from falling to the ground.



T&B's Forty-Ten Hydraulic Head, Cat. No. 21940, specially designed for transmission line building.

or ON THE GROUND

Demountable legs hold T & B's Forty-Ton Hydraulic Head at convenient working height when installations are being made on the ground. During operation, hardened steel dies compress fitting and cable hexagonally into one homogeneous mass . . . all in a few seconds. The same die set installs tension splicers, dead ends, loop splicers and taps, tees and terminals.

Modern hydraulic design has virtually eliminated the need for maintenance. However, field maintenance is simple and practical. The 21940 Installing Head can be completely disassembled and reassembled in less than one-half hour with these common tools: screw driver, Allen wrench, and mallet.

T&B Bulletin 70 gives a detailed description of the Forty-Ton Hydraulic Head as well as complete lines of T&B connectors, tools, and accessories for transmission line building. Send for FREE copy.

LOOK FOR THIS SIGN —

AUTHORIZED DISTRIBUTOR T&B ENGINEERED

IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T-418

THE THOMAS & BETTS CO.

INCORPORATED

14 Butler Street • Elizabeth 1, New Jersey
Thomas & Betts Ltd., Montreal, P.Q., Canada
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

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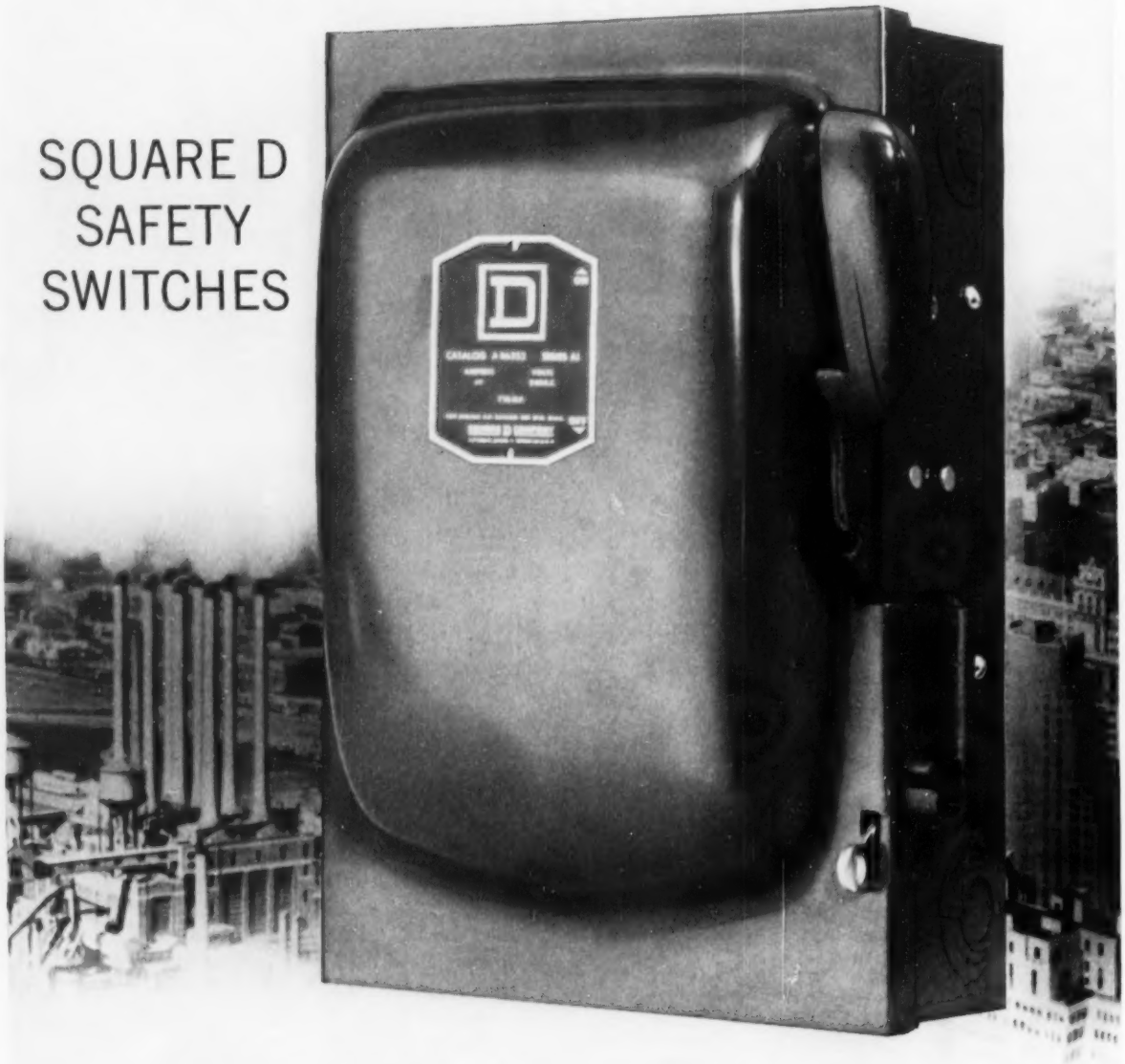
First choice for 50 years

SQUARE D
SAFETY
SWITCHES



COMPARE...*LINE for LINE* and *FEATURE for FEATURE*

THEY COST NO MORE...WHY SETTLE FOR LESS?

SAFETY SWITCHES and other Square D Products are distributed by GRAYBAR

SQUARE D COMPANY

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

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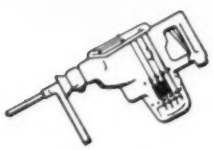
when you must

CUT COSTS

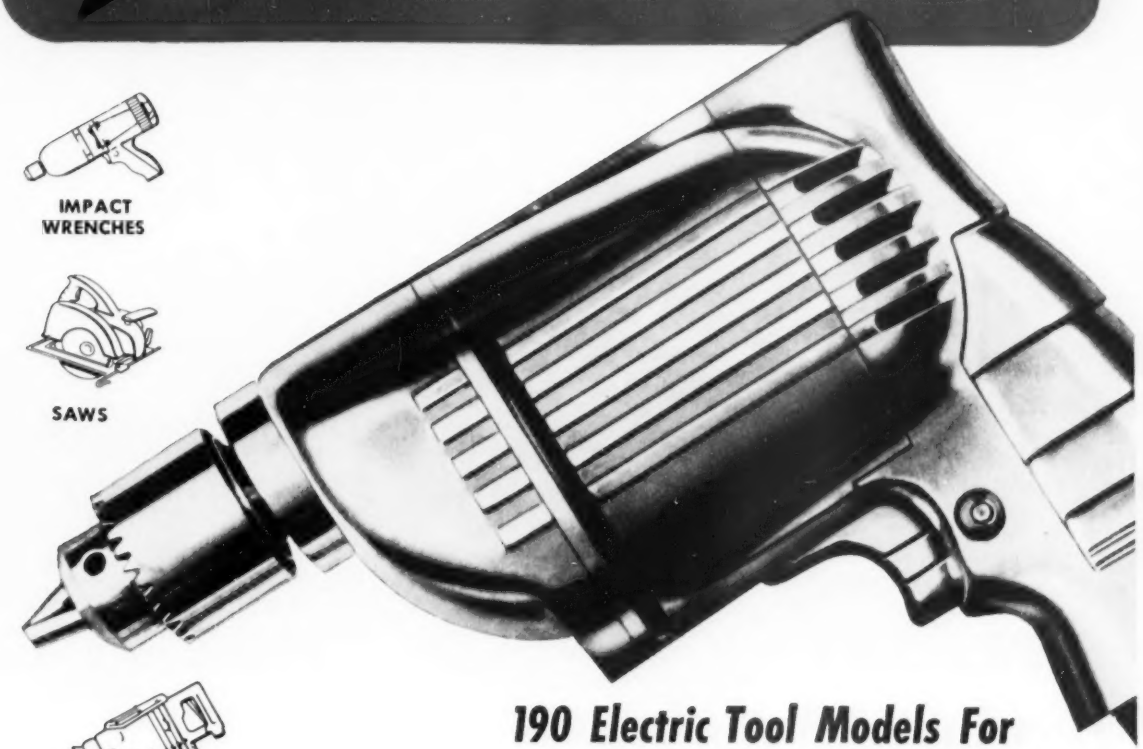
Thor POWER TOOLS ARE THE ANSWER!

IMPACT WRENCHES

SAWS



HAMMERS



190 Electric Tool Models For Every Production, Maintenance and Service Requirement

For quick and drastic cuts in operating expenses, equip your men with POWER TOOLS. Specify THOR for the quality that pays double dividends in extra long trouble-free service. Stocked by your supply distributor. Thor Power Tool Company, Aurora, Ill.

- ELIMINATE COSTLY HANDWORK
- INVEST IN QUALITY TOOLS

Thor TOOLS

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

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Model 622 – Ultra-Sensitive Instruments

Portable d-c and a-c thermo instruments for precision measurement of potentials and minute currents in electronics or laboratory research.

Specialized and Multi-purpose INSTRUMENTS

for

- **RESEARCH**
- **PRODUCTION**
- **MAINTENANCE**

For complex, or just routine measurement jobs, these and other specialized WESTON Instruments save time and assure dependable measurements. For information on the complete line, see your local Weston representative, or write . . . WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

WESTON *Instruments*

Model 901
Portable Test Instruments

Available in d-c, Model 901 –and a-c, Model 904, single and multiple ranges of wide coverage. Excellent scale readability and shielding. Accuracy within ½ of 1%.

A-C Clamp Volt-Ammeter

(Model 633, Type VA-1) For convenient and rapid measurement of a-c voltage and current without breaking the circuit. Jaws take insulated or non-insulated conductors up to 2" diameter. Safe, rugged, versatile. Also available as a-c clamp ammeter, without voltage ranges.

Sensitive Relays

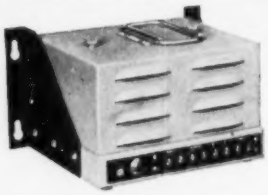
A line of sensitive relays including the Model 705 which provides positive operation at levels as low as ½ microampere. Non-chattering magnetic contacts handle up to 10 watts at 120 volts.

Panel and Switchboard Instruments

A complete line of instruments in all types, sizes and ranges required for switchboard and panel needs . . . including d-c, a-c power frequencies and radio frequency, rectifier types and D.B. meters.

Model 697 Volt-Ohm-Milliammeter

One of a line of pocket-size meters, Model 697 combines a selection of a-c and d-c current, and resistance ranges. Ideal for maintenance testing and many inspection requirements.



Model 1411 Inductronic D-C Amplifier

Stable amplifier provides high degree of resolution even at fractional loads. Reaches steady full scale deflection in a fraction of a second. Interchangeable plug-in range standards for either microamperes or millivolts.

Industrial Circuit Tester – Model 785

A multi-range, multi-purpose, ultra-sensitive analyzer, for laboratory and industrial checking of electrical and electronic circuits. Has 28 practical scale ranges; measures d-c and a-c voltage, d-c and a-c current, and resistance. Accessories available to extend ranges. Compact and portable; furnished in either oak or steel case.

Model 686
Electronic Tube Analyzer

Tests tubes under exact operating potentials. Accurately determines true mutual conductance of all tubes, In accordance with manufacturers' rated operating conditions, or under special operating conditions.

High Frequency Electronic Analyzer
Model 769

A three-in-one instrument providing a self-contained Volt-Ohm-Milliammeter, a high impedance electronic D-C Volt-Ohmmeter, and a probe type Vacuum Tube Voltmeter for use to 300 megacycles. Exceptionally stable and accurate. Has specially designed extremely small RF and D-C probes.

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

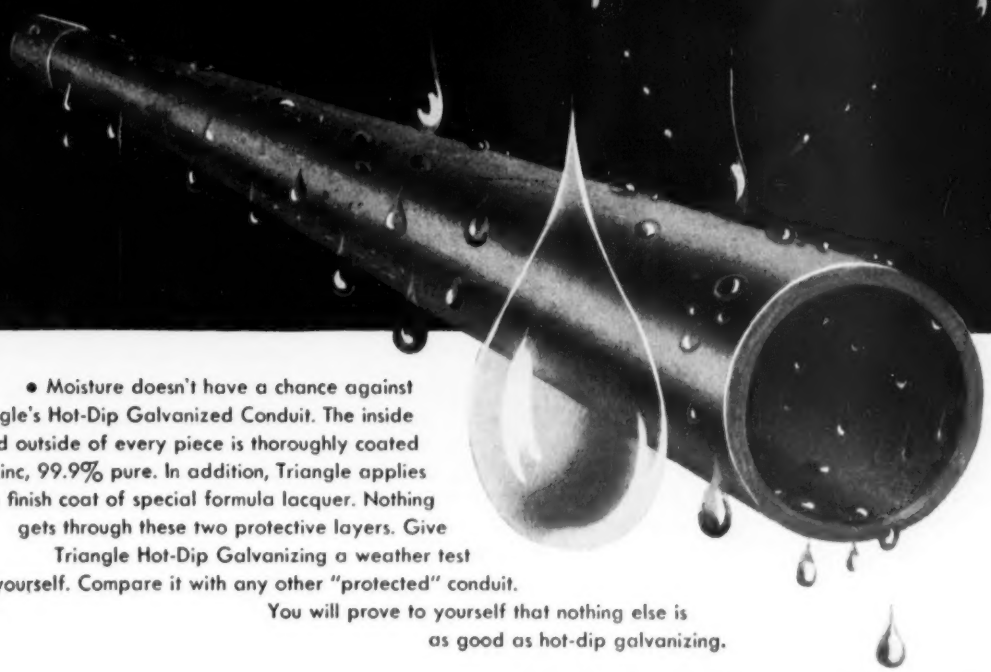
Distributed by Graybar

MOISTURE IS LOCKED OUT

because TRIANGLE Rigid Conduit is

Hot Dip

GALVANIZED INSIDE AND OUTSIDE



• Moisture doesn't have a chance against Triangle's Hot-Dip Galvanized Conduit. The inside and outside of every piece is thoroughly coated with zinc, 99.9% pure. In addition, Triangle applies a finish coat of special formula lacquer. Nothing gets through these two protective layers. Give Triangle Hot-Dip Galvanizing a weather test yourself. Compare it with any other "protected" conduit. You will prove to yourself that nothing else is as good as hot-dip galvanizing.

HOT DIP GALVANIZED—inside and outside!

TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, N. J.

Manufacturers of Arteries for Electricity, Liquids and Gases

WIRE • CABLE • CONDUIT • PLASTIC PIPE • BRASS AND COPPER TUBE

PLANTS — NEW BRUNSWICK, N. J.: WIRE AND CABLE PLANT • ROD MILL • BRASS AND COPPER TUBE MILL • PLASTIC PIPE PLANT • **MOUNDSVILLE, W. VA.:** CONDUIT PLANT
WAREHOUSES — BOSTON • CHARLOTTE • CHICAGO • LOS ANGELES • SAN FRANCISCO

It Must Be Right
The Trade Mark of TOP Quality
TRIANGLE

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA
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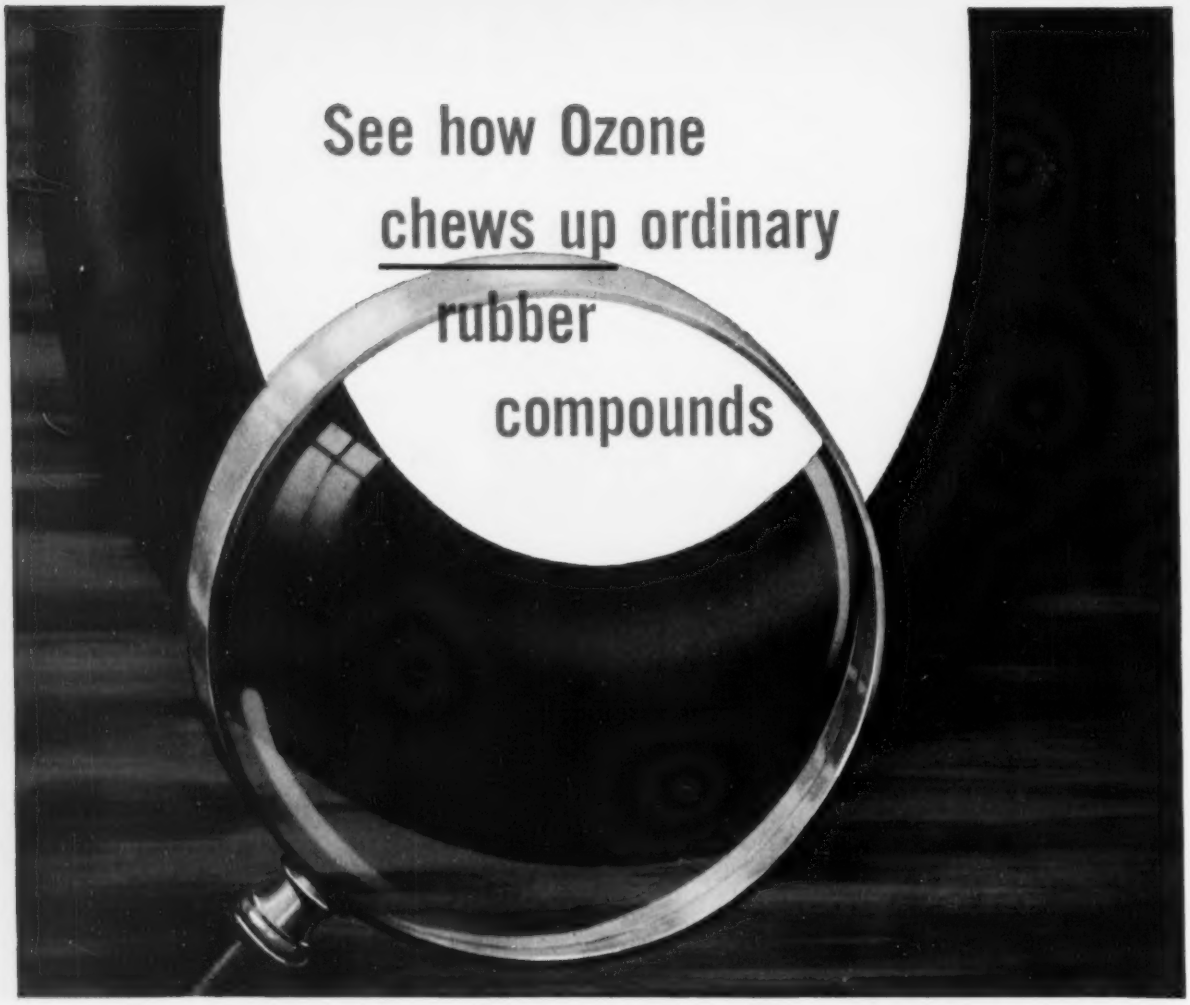
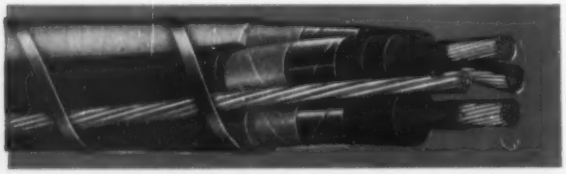


but not U. S. Grizzly Uskorona-insulated power cables

Here's an illustration showing how ozone can chew up a sturdy, rugged cable. This can never happen with United States Rubber Company's famous Grizzly® power cables, insulated with Uskorona® compound which prevents electrical failure caused by ozone (Uskorona-1 oil base compound and Uskorona-2 butyl base compound). Uskorona meets (and in many ways exceeds) the applicable IPCEA specifications for ozone-resistant rubber insulation.



U.S. Grizzly Uskorona-insulated Power Cable, 15,000 volts, Type RR, 3 conductor, shielded, Neoprene jacket

U.S. Grizzly ozone-resistant power cables are typical of the wires and cables "U.S." develops to meet the ever-increasing rate of expansion of electrical generation and construction. "U.S." is always ready with new products to meet new demands and is always developing, as a matter of policy, wires and cables that are more economical because they are more serviceable.

Send for free illustrated book giving full information about U.S. Electrical Wires and Cables for the Electric Utility Industry.

US RUBBER

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE & CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by Graybar

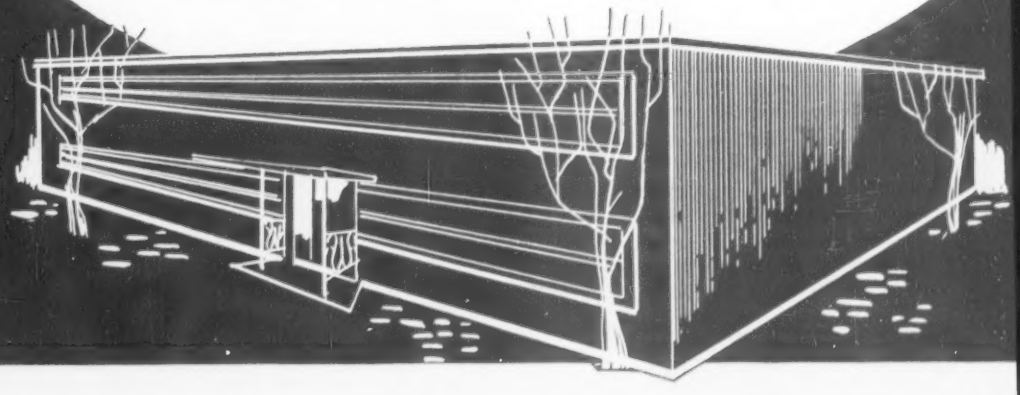
Wheeler Lighting Installation
for Doelcam Corp., Boston, Mass.
Lockwood Greene Engineers, Inc.

Wheeler

LIGHTING FIXTURES

A BASIC PRODUCTION TOOL OF AMERICA'S LEADING INDUSTRIES!

Where good lighting is a "must," you'll find Wheeler on the job! In industry after industry . . where modern progressive thinking rules . . Wheeler Lighting Fixtures are the logical choice for maximum lighting efficiency!



HERE'S ANOTHER QUALITY PRODUCT AVAILABLE VIA GRAYBAR

Distributed by Graybar

There's a Graybar office or warehouse *near YOU*

Local stocks of standard utility needs and fast delivery of nonstock lines assure on-schedule deliveries when you order 100% via Graybar. There's a minimum of paper work involved and there's no problem in co-ordinating deliveries from numerous widely separated suppliers. And you can be sure Graybar thoroughly understands your needs—routine and emergency—for we've been serving the utility industry ever since the first lines went up. Check the list below for the Graybar office or warehouse nearest you, then make it a point to *call Graybar first!*

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Birmingham
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CALIFORNIA
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Oakland
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San Bernardino
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COLORADO
Denver

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Washington

FLORIDA
†Fort Lauderdale
Jacksonville
Miami
Orlando
†St. Petersburg
Tampa

GEORGIA
Atlanta
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IDAHO
Boise

ILLINOIS
Chicago
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INDIANA
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IOWA
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NEW HAMPSHIRE
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Clifton
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Graybar Everything Electrical

GraybaR ELECTRIC CO., INC., 420 Lexington Avenue, New York 17, N. Y.

IN OVER 110 PRINCIPAL CITIES

Electric Debarker Speeds Sawmill Production

CHARLES MILLAR Industrial Power Representative Pennsylvania Power & Light Co Wilkes-Barre, Pa.

Installation of an electric log debarker at Robert Irving Saw Mill, Girdland, Pa., has increased production and turned out more uniform sized lumber. Previously it was often necessary to stop the mill three or four times a day to sharpen the saw. Now the saw is sharpened once a day with an occasional "touch-up" at noon. Log handling has also been cut down as the logs are now unloaded directly on the saw skidway in place of the previously-used method of placing them in a heated pool before sawing in order to clean off frozen dirt, stones and mud.

Installation consists of a 2-hp motor mounted on a board or frame about 6 ft long which is hinged, counterbalanced and mounted to right above the operator's head. The motor with V-belt-drive runs a ratchet-type wheel of steel, 8 to 10 in. in diameter, with six or seven teeth about ½-in. wide, directly in line with the cutting teeth of the main saw. With the log in place on the saw carriage, the operator lowers the debarker to the log . . . and as the carriage moves the log toward the main saw, all bark and dirt are removed from the path in front of the main saw.

DEBARKING LOGS with electric debarker eliminates stoppages previously necessary for saw sharpening and reduces log handling. Lumber produced is now more uniform in size

Tank Heaters Eliminate Fire Hazard and Insurance Objections

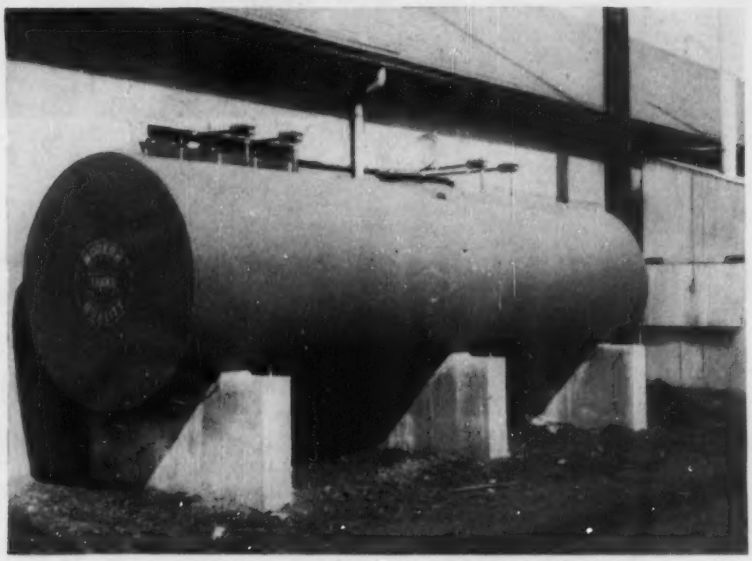
D. E. DOME, Commercial Industrial Dept Ohio Power Co, Newark, Ohio

Heating asphalt in storage tank with 24 kw in immersion heaters at the Tectum Corp, Newark, Ohio, has improved the application of asphalt water-proofing compound to building material roof deck sections.

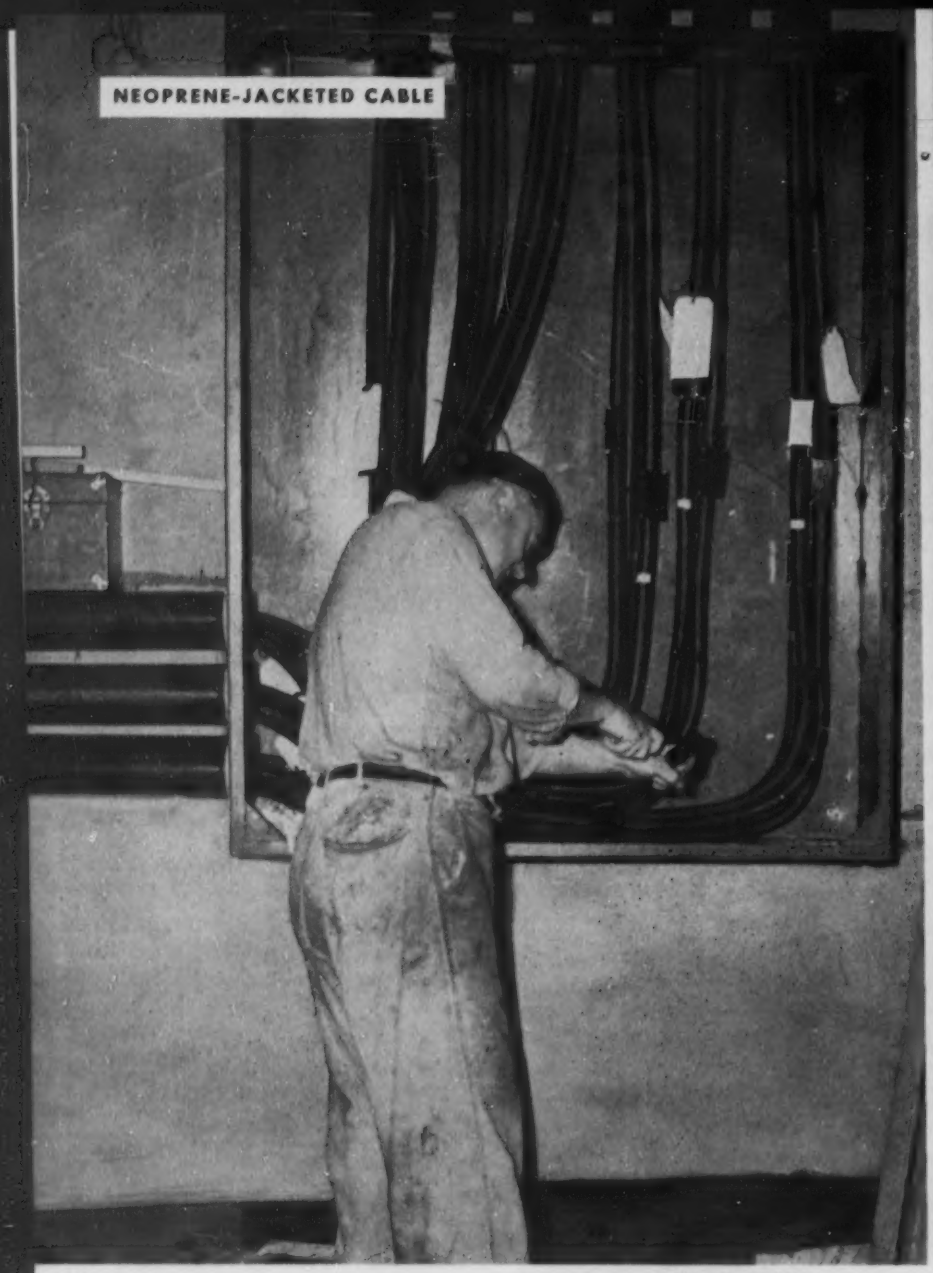
Previously, asphalt was purchased in chunks and was melted by gas prior to application. Both the fire hazards and the insurance objections of this method have been eliminated with the electrically heated tank. Tank is 6 ft in diameter and 24 ft long and contains approximately 5,000 gal of asphalt. Asphalt is purchased from the supplier and delivered in a molten state and maintained in the tank at approximately 350 F until needed.

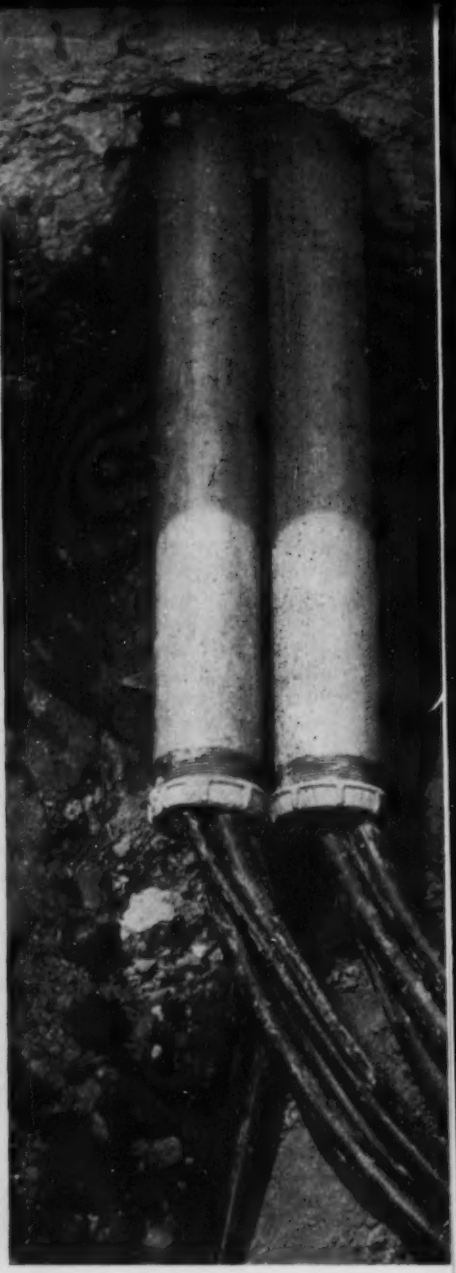
Material is maintained at temperature 24 hr a day, and is transported to applicators by re-circulation.

(*More Industrials on page* 236)



IMMERSION HEATERS in 5,000-gal asphalt storage tank maintain temperature at 350 F 24 hr daily. Former fire hazards and insurance objections have now been eliminated





. . . FOR PLANTS

How to get premium wiring for little more

The cable to use is DURASHEATH.
Its actual over-all cost is so little more than the cheapest cable

Wait! Before you buy cable on price alone, see how *little* a premium wiring job actually costs. And what good insurance it is!

When you're wiring up, for power or lighting, the price of wire and cable is but a *fraction* of the over-all cost. Simple arithmetic follows — *it makes very little difference in the total cost of the job* whether you buy

. . . FOR UTILITIES

. . . FOR COMMERCIAL BUILDINGS

than you now pay

the cheapest cable or a premium cable like neoprene-jacketed Durasheath*.

But what a difference there can be in performance!

Anaconda's Durasheath is tough . . . heat-resistant . . . long-lasting. Its rugged neoprene jacket resists moisture, chemicals, sunlight, corrosion, electrolysis, abrasion and mechanical injury. It delivers real service dependability year after year.

And Durasheath is good for almost any job you have. You can bury it directly in the ground . . . run it in damp ducts . . . string it overhead . . . in *one continuous run* with minimum splicing. Order through your Anaconda Sales Office or distributor. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

*Reg. U. S. Pat. Off.

54366

ANACONDA®

Primary and secondary distribution cable • building wire • portable cords and cables • mine cable • magnet wire • copper, aluminum, copperweld conductors • signal, control and communication wire • wire and cable accessories.

the PHONE with * THE Q-ZONE LICKS NOISE!

The GAI-PHONE
ELECTRONIC TELEPHONE
MAKES COMMUNICATION POSSIBLE IN EXTREMELY NOISY AREAS

Providing dependable telephone service into and from noisy areas *without sound-proof booths*, the GAI-PHONE is operated and connected like a conventional telephone. Designed for dial or manual operation, desk-top or wall mounting, it can be mixed with conventional telephones in the same system. The adjustable transmitter and receiver levels, as well as the adjustable side-tone level, not only assures the greatest operating comfort in noisy areas, but makes the GAI-PHONE very effective over long lines *without repeaters*. Rugged trouble-free design assures long life.

MODEL 200

Designed for wall or column mounting, this model can be used in many noisy locations where a sound-proof booth is not only undesirable but impractical. For example, when equipped with retractile cord (illustrated) and installed on Boiler Control panel, operator's freedom of action and effectiveness are increased greatly.

MODEL 100

Combining all of the GAI-PHONE'S operational features with modern, streamline design makes this model ideal for desk or table top installation.

GAI-TRONICS CORPORATION
READING, PENNA.
A SUBSIDIARY OF GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS

FOR FREE BOOKLET WRITE DEPT. EP

IMPURITIES ARE SILHOUETTED as fruit passes over inspection table. Two lamps mounted below glass table top light surface. Cost of luminous components was under $100

Transillumination Improves Preserves

RAYMOND P. BENTON, Lighting Engineer, Pacific Gas & Electric Co, Oakland, Calif.

Lower production cost and better quality of preserves has resulted from the use of transillumination inspection at Tea Garden Products Co, San Leandro, Calif. The installation was designed by Pacific Gas & Electric Co following a lighting survey for the company.

Formerly, inspection of translucent preserves was handled by flowing fruit over a steel table with 30 to 100 ft-c falling on the upper surface of the product. However, reflected glare made the detection of impurities difficult and skilled inspectors could see only surface characteristics.

A luminous inspection table was made by replacing the metal-top table with Tuf-flex glass, which is resistant to mechanical and thermal shocks. The 2x3-ft luminous area is lighted by two T-8 36-in. fluorescent lamps mounted about 4 in. below the glass plate.

A brightness of at least 20 foot-lamberts is produced. Any foreign matter in the preserves is silhouetted as a black object in a field of glowing sound fruit. Now only one inspector does the job which formerly required several.

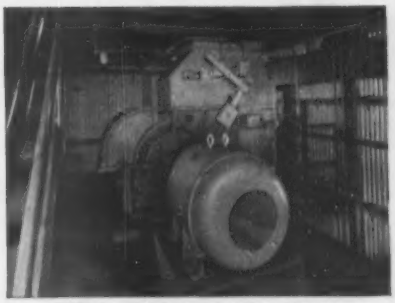
Electric Furnaces Make Better Products

Sintering iron powder in controlled atmosphere electric furnace at Pow-Met Industries Inc, Dayton, Ohio produces a high-strength, high-density metal product that is uniform and holds close dimensional tolerances. The iron powder is molded under very high pressure (120,000 psi) before sintering. A good 8 to 15 micro inch surface finish is produced—comparable to a ground or lapped surface. Strength of the product is in excess of 180,000 psi. Sintering, pressing and resintering operation is used to get final density. Product is then carburized, hardened and tempered. Process can be stopped at any point to get desired characteristics. Sintering furnaces are electrically heated, an electric atmosphere generator produces desired conditions and heat treating is done electrically. There are 2—35-kw electric furnaces; atmosphere generator is 15-kw; heat treating unit is 35 kw, and tempering furnace—15 kw. H. W. Titus, Power Sales Engineer, Dayton Power & Light Co.

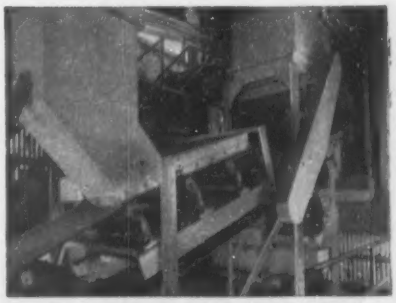
General View of Bay Front Steam Plant
Lake Superior District Power Co.
Sargent and Lundy
Consulting Engineers

Bartlett-Snow coal handling at Ashland

● The illustration above shows the first 38,600 KW unit of a plant which is to be extended into a 60,200 KW station. Coal is received by lake boat at a near-by deep water dock, and carried to the plant in railroad cars. All handling facilities including the track hopper and grillage, duplex feeder, conveyors, gallery, chutes, tripper and all supporting structures, were fabricated in our shops and installed by our erectors to Sargent and Lundy specifications. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers work with you on your next job.



150 Ton Per Hour Ring Roll Crusher
Showing By-Pass Gate and Drive



Belt Conveyor Showing Automatic
Weightometer and Vertical Take-up

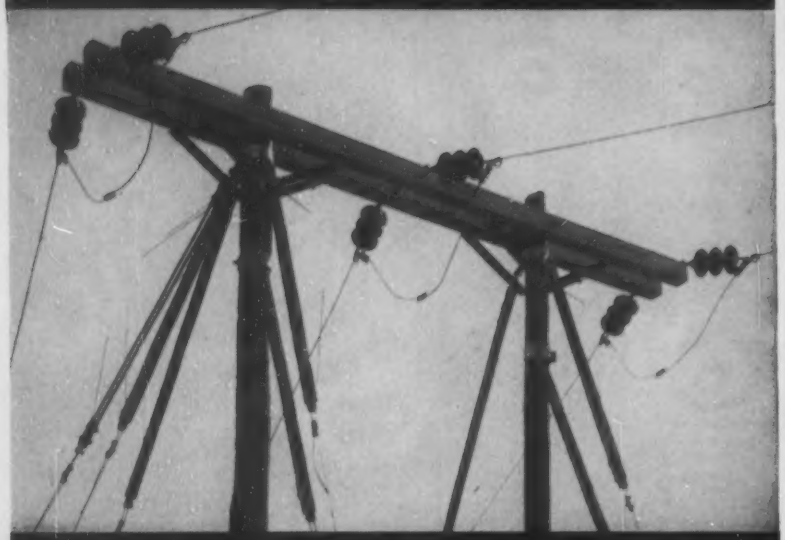
DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

"Builders of Equipment for People You Know"

PUT UP



AND STAY UP

with LAUGHLIN drop forged steel hot galvanized FITTINGS

Transmission or distribution - guys stay put when they're fastened with Laughlin fittings. Their extra strength, extra quality makes them outlast ordinary fittings on every job. Try them yourself — and see!

SAFETY "FISTGRIP" WIRE ROPE CLIPS

Drop forged steel, hot galvanized, with standard heavy hex nuts. Foolproof, identical saddles can't be put on wrong. Fewer clips needed, holding power is greater than with conventional clips. Sizes for strand diameter from 3/16" to ⅝" Smooth Bore, 3/16" to 1½" with Rifled Bore.

SHACKLES

Round Pin Chain
Round Pin Anchor

Weldless, drop forged steel, available with screw pins, round pins with cotter, hex head bolts and nuts with cotter. Sizes from ¼" to 3"

THIMBLES

Wrought steel, galvanized, in both regular weight and heavy plow steel. Open Guy Thimbles stocked in ⅜", ½" and ⅝" sizes.

TURNBUCKLES

Sturdy drop forged steel, weldless, hot galvanized. Available in: (1) hook and eye, (2) eye and eye, (3) jaw and eye, (4) hook and hook, (5) jaw and jaw. Heavy reins with hex ends, precision threading. Exclusive eye design takes shackle one size smaller than turnbuckle diameter. Sizes (diameter & takeup) ¼"x4" to 2¾"x24".

These are only part of Laughlin's complete line of over 1500 types and sizes of wire rope and chain fittings. The line also includes safety hooks, wire rope sockets, swivels, double clevis links and weldless rings.

For complete data, ask for Catalog 155. Laughlin fittings are available through leading distributors everywhere.

Photo courtesy Charles E. Eaton

LAUGHLIN

THE THOMAS LAUGHLIN COMPANY

626 Fore Street, Portland, Maine

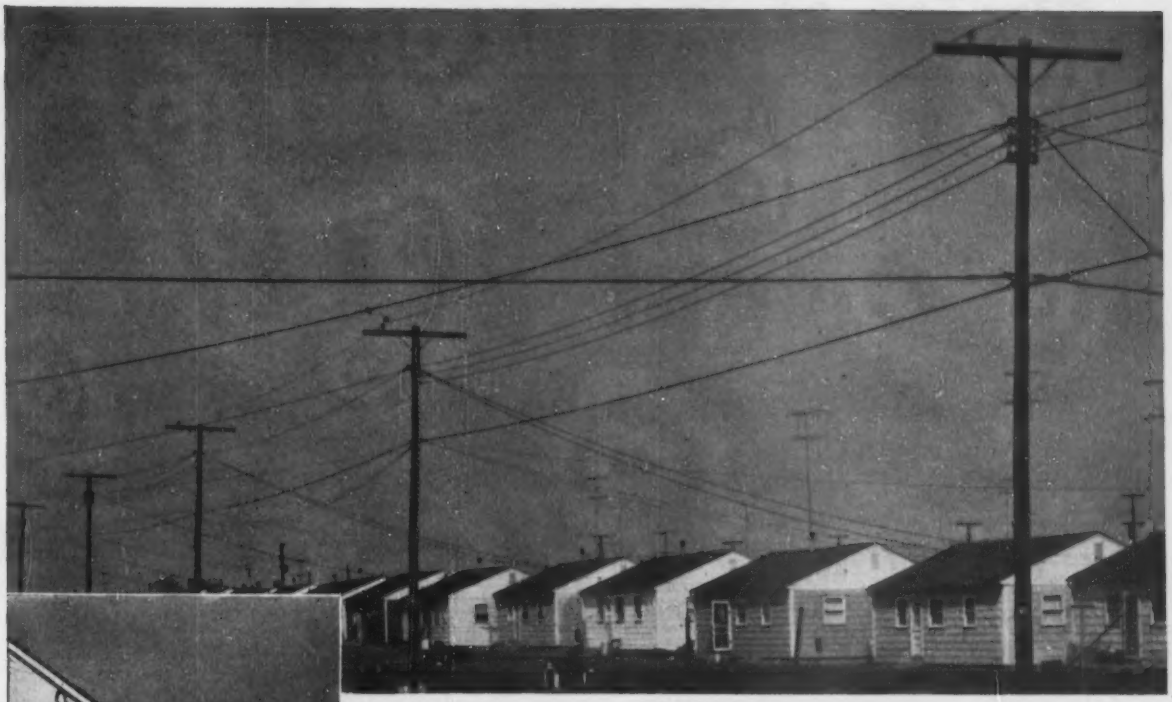
INDUSTRIAL BRIEFS

Air conditioning of the mixing department of Dolly Madison Cake Division of Interstate Bakeries, Inc, Cincinnati, O., with two 15-ton units has produced better and more uniform mixing and a higher quality product. Rejects have been reduced and employee comfort and morale is increased. This 30 tons of air conditioning is in addition to three 15-ton units previously installed in the finishing room of this plant and in the mixing departments of other plants. It prompted this company to make the second installation. T. V. Morrow, Power Engineer, Cincinnati Gas & Electric Co.

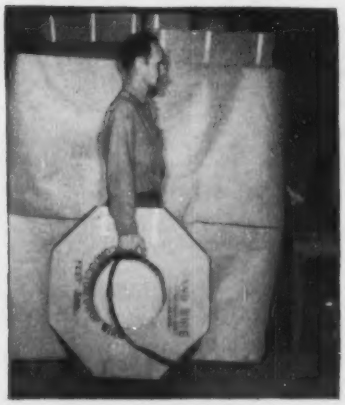
Convertible lighting in new warehouse addition of Williamsport Battery Co, Williamsport, Pa., permits removal of incandescent units and replacement with fluorescent units if warehouse is utilized as manufacturing area at future time. Present 11-kw incandescent warehouse area illumination averages 15 ft-c. Harry Moore, Industrial Power Representative, Pennsylvania Power & Light Co, Williamsport, Pa.

Heating brine solution with electric emersion heaters at Wm Focke's Son's Co, Dayton, Ohio holds temperature at 127 F during 10-hr period to cook new type of bacon. This thermo cure process prepares the bacon in a 10-hr period as compared with old curing process which required from 8 to 10 days. Bacon has a brighter and more uniform color and uniform cure penetration throughout, making for a milder salt content and a more palatable product. Each of three cooking tanks has 3 - 18-kw heaters. T. E. Bennett, Power Sales Engineer, Dayton Power & Light Co.

Heat treating solderless connectors in two 15-kw electric salt bath units at Marine Aircraft Products, Inc, Carlisle, Pa., has produced a more uniform quality product, with less rejects and reduced maintenance costs. The electric immersion heaters replaced formerly-used gas fuel in these salt bath units which lacked uniform temperature control. Maintenance of venting from the gas units was also an expensive problem. Joe Mumma, Industrial Power Representative, Pennsylvania Power & Light Co, Harrisburg, Pa.



Wire assembly is anchored to house and pole by the bare neutral. Older method required anchoring three wires, cost more in time and material.



One man can easily carry 500 feet of this drop wire covered with BAKELITE Polyethylene.

33% LESS WEIGHT FOR DROP WIRE

BAKELITE Polyethylene covering on Aluminum Wire means easy handling, fast installation

Weight is no problem with the 90-foot spans of service drop wire illustrated, as used by The Ohio Power Co. One man easily carries a 500-foot coil of this wire. Its two 7-strand No. 4 aluminum conductors are covered with a minimum two sixty-fourths inch of BAKELITE Polyethylene, the lightest commercial plastic. Result—33% less weight than wire with a covering formerly used.

The bare neutral supports the whole assembly. It's the only wire anchored, so installation is simpler and more economical than with older types. Conductors are free of tension.

Several additional advantages may be expected for wire and cable applications where BAKELITE Polyethylene is employed as covering. Tests on the black compound indicate a service life of several decades. It won't festoon. It resists moisture, oil, most strong acids, alkalies, and mildew, stays tough and flexible at —70 deg. C. and resists deformation at temperatures around 90 deg. C. It can be used in thinner wall sections, making pulling and stripping easier.

Ask your cable supplier for complete details on wire and cable covered with BAKELITE Polyethylene, or write Dept. YB-63 for a list of representative suppliers.

BAKELITE
TRADE-MARK
Polyethylene
FOR WIRE COVERING

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N.Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario

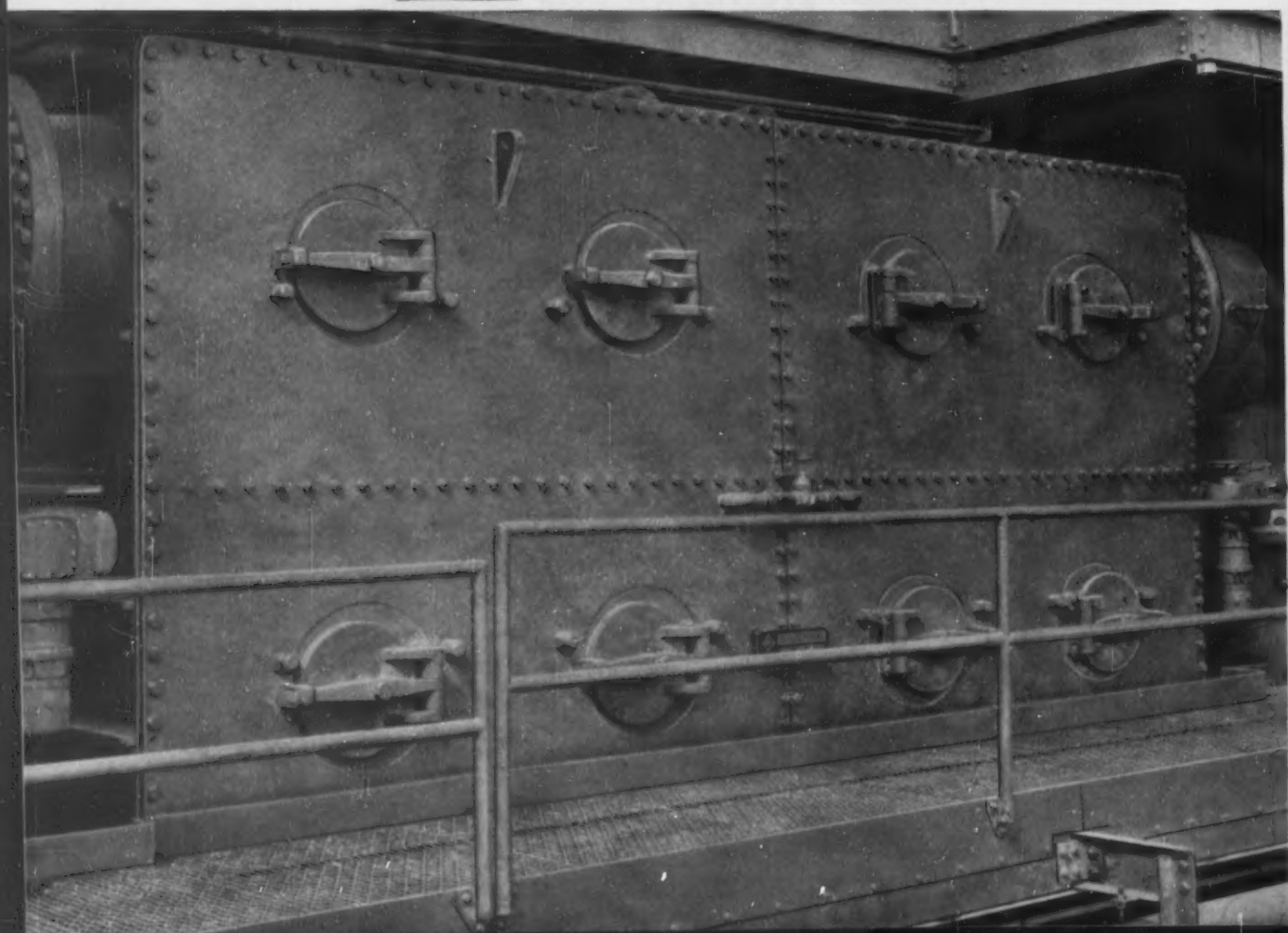
Choice of condenser shapes . . .

Rectangular,

For complete flexibility in power plant design, Allis-Chalmers condensers are built with steel or cast-iron water box, and in shapes to meet any space requirements

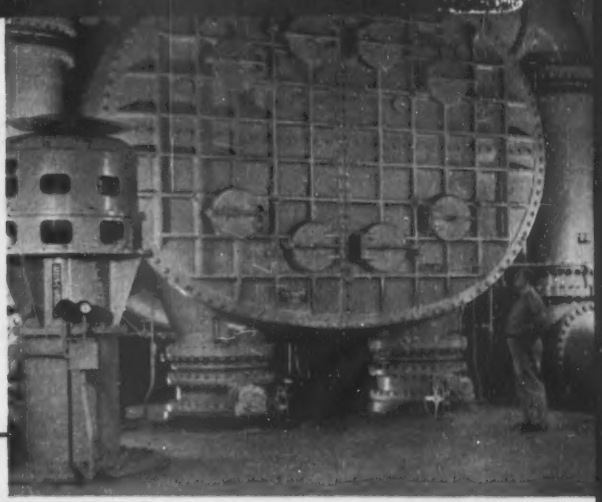
---

Rectangular Allis-Chalmers 50,000-sq-ft, two-pass, divided water box surface condenser.



Oval and Round

ALLIS-CHALMERS Custom-Engineered CONDENSERS



Oval condenser helped this power plant get greater utilization of space. Unit is a 45,000-sq-ft, two-pass surface condenser.

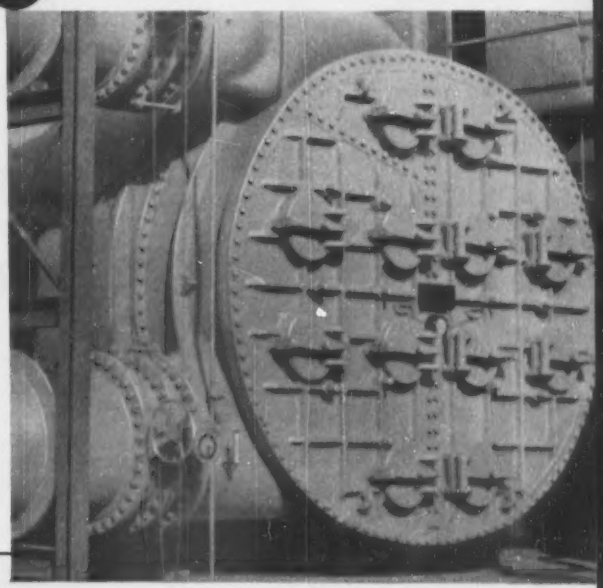
As a leader in building condensers, A-C is familiar with all problems of custom-engineering a condenser to meet unusual space requirements. In addition, Allis-Chalmers production facilities are set up for routine handling of any type or size unit.

GET ENGINEERING HELP

A-C will cooperate with your engineers to help you get top efficiency — in terms of condenser performance — as well as greater overall value for all your power plant dollars. Contact your district representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

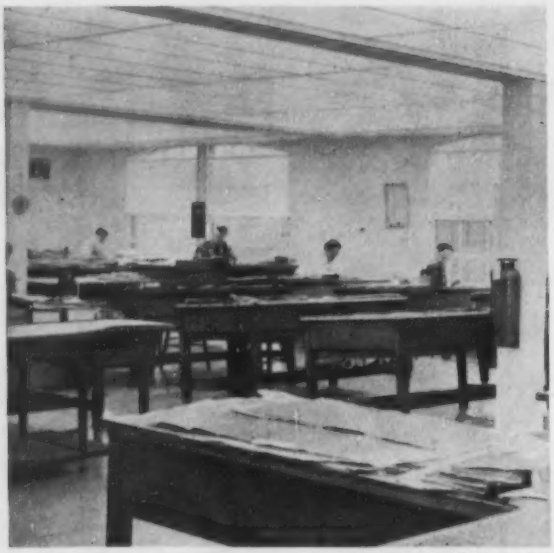
A-4393

Round 35,000-sq-ft, two-pass side steam inlet condenser.



A-C ALLIS-CHALMERS

ALLIS-CHALMERS

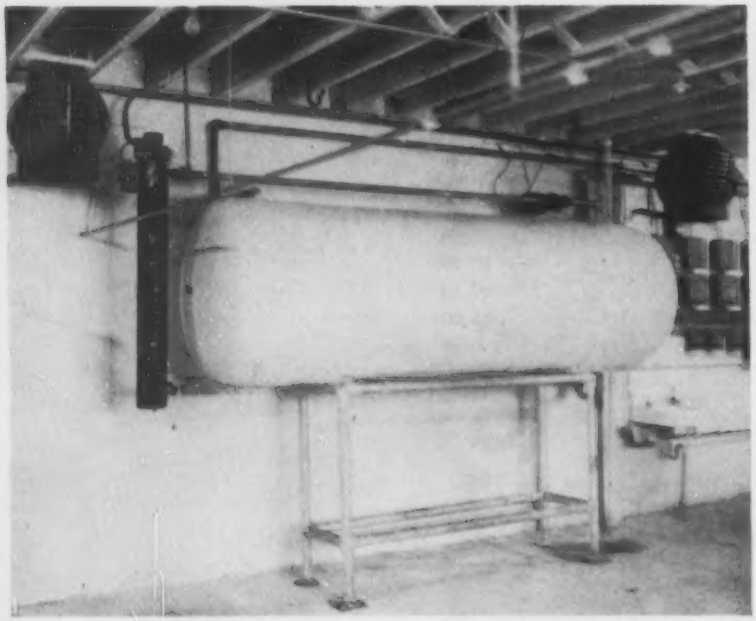


Smithcraft Lighting Division

The Cluttered Is Uncluttered

Among the many benefits from relighting to modern standards is that it cleans up the place. In the engineering department of the Atlas Car and Manufacturing Co in Cleveland, Ohio, was a lighting arrangement that evidently grew like Topsy and with as little attention. See how the heterogenous collection of fixtures in general and local lighting has been swept away by the area illumination of the ceiling. Eye-straining spotty lighting and sharp shadows are superseded by evenly distributed light averaging 120 ft-c over the whole area.

Electric Heat Keeps High School Athletes Happy



Circulation of warm air for comfort, ventilation and drying out uniforms, and hot water for showers, are provided by electricity in this athletes' locker room

WAYNE CRIST, Indiana & Michigan Electric Co, Marion, Ind.

Locker and shower facilities at the Marion, Indiana, High School athletic field are located in a building some distance from the nearest school building. Electric heat is filling the need very nicely in this case where school building steam is not readily available.

The locker building is unusual in that all major construction was done by high school vocational classes. It is 25 ft by 50 ft and is constructed primarily of concrete blocks. Uniform and equipment storage facilities are provided as well as showers for athletics.

The room is heated by three 15-kw forced-circulation air heaters controlled automatically by a thermostat. This system, used in conjunction with an exhaust fan, has proven unusually successful in removing the large quan-

● This Load Dispatcher has his finger on the optimum solution to any load-frequency control problem which his system is apt to encounter. The L&N control console which he uses is the end result of utility-L&N teamwork in solving the requirements of 300 control installations throughout the country during the past quarter-century.

In the early planning of the above installation, for example, engineers faced a number of unsolved control requirements such as the ones which may now confront you. There were considerations of varying unit characteristics, overall area requirements, interchange obligations, and parallel operation of the control equipment with corresponding equipment in neighboring systems.

The best overall solution to these and many more requirements was formulated by L&N Engineers. Their experience is similarly available to assist you in putting permanently increased operating efficiency into your system.

For a comprehensive picture of how advanced L&N Load-Frequency Control can benefit you, contact our nearest office, or 4938 Stenton Avenue, Philadelphia 44, Pa.

Jrl. Ad ND4-56-461(15)

Every Movement has a SAVINGS of its own . . . . .

SAVE UP TO 75% of MATERIALS HANDLING COSTS WITH

HEAVY-DUTY FORK LIFTRUK OR LIFT-O-KRANE

Leading Public Utilities find these heavy-duty, rugged SILENT HOIST machines dependable and efficient for the continuous, complex requirements of the transportation department, storage area, repair shop . . . in the movement of Generators and other heavy equipment, Cable, Wire, Maintenance Supplies, Poles and general equipment.

The LIFTRUK *Fork Lift Truck* and LIFT-O-KRANE *Combination Crane and Fork Lift Truck* handle capacity loads with maximum stability and safety. They have high lifting range. Make short turns in narrow spaces. Promote maximum efficiency for storage areas . . . and effect rapid inloading and outloading, with economic use of manpower.

Send for Bulletin 77 for LIFTRUK. Bulletin 75 for LIFT-O-KRANE

Makers of KRANE KAR Mobile Boom Crane, KARRI-GO Front Boom Crane, SILENT HOIST Cranes for Motor Truck Mounting, SILENT HOIST Winches and Capstans, SILENT HOIST Hydraulic Telescopic Truck Towers, etc.

SILENT HOIST & CRANE CO.
Pioneer Manufacturers of Heavy-Duty Equipment for Public Utilities and Municipalities

tities of moisture and stale air which are present in dressing rooms. It is also very satisfactory from the standpoint that athletic uniforms can be thoroughly dried between daily practices since the warm air passing through the equipment rapidly removes all traces of moisture.

Water for showers is also heated electrically. A 15-kw circulating heater together with a 500-gallon insulated storage tank has been entirely adequate for this purpose. A small circulating pump which is controlled in conjunction with the water heater provides a full tank of hot water at all times.

The successful operation of this entire building during the past season has resulted in plans for a second installation nearby to be used by visiting teams.

Range Promotion Offers $25 Trade-in

Replacement of all old-style household ranges and cooking stoves was the primary goal of an electric range campaign for April and May sponsored by Utah Power & Light Co and Western Colorado Power Co jointly with the Intermountain Electric Assn. The program featured a $25 trade-in allowance on old equipment toward the purchase of a new electric range during the campaign period. The trade-in equipment was scrapped to remove it from any later sale in the used-range market.

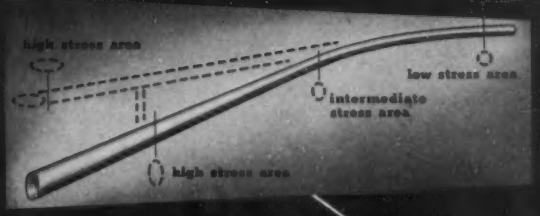
The trade-in allowance was given to the customer by the dealer at the time of purchase. Only one trade-in was accepted for each range sold and connected. Repayment of the allowance by the utilities was made after old ranges and invoice slips were delivered by dealers to the offices of the utilities.

Supporting advertising carried on by the power companies included newspaper ads, radio and TV announcements, outdoor billboard displays and direct mailings.

Cold Cathode Lighting Corp

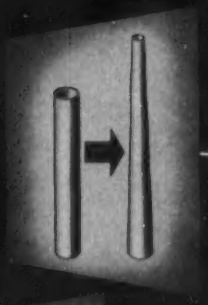
New Development in Cold Cathode

Special feature that makes distinctive this marquee lighting of Restaurant Mayan in New York's Rockefeller Center is the use of a newly-developed cold-cathode tube. The new tube is 1.5 inch in diameter, larger than heretofore available, and is of the lower surface brightness. The lamps in the marquee are hair-pin shape, 8 feet in length.



FIRST to provide ample strength in all-aluminum arms and arm-shaft joints through patented, seamless elliptical arms requiring no bracing for lengths up to 8 feet. On longer arms, one horizontally elliptical member, integrally welded to the arm, eliminates need for side-sway bracing.

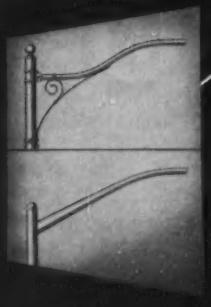
FIRST to develop fabricating equipment and methods to permit use of high strength aluminum alloys.



FIRST to develop and produce seamless, tapered shafts from high-strength, extruded tubing in a wide range of diameters.

FIRST to pioneer the Aircomatic method of welding for fast, strong welds and negligible deterioration of alloy strength. All P & K welds are guaranteed . . . all P & K welding personnel and equipment is certified by U. S. Government agencies.

FIRST to stress use of castings of heat-treatable aluminum alloy, and first to introduce permanent mold castings for transformer bases, shoe and pedestal bases . . . with smooth surfaces and strong grain structure.



FIRST to eliminate unnecessary scrolls, tie-rods and other ornamental frills.

FIRST to design and build its own tapering machine to handle all diameters of extruded aluminum tubing.

Seven firsts . . . . . All are P&K

P & K . . . Producer of America's Most Modern All-Aluminum Standards and Brackets

FOR LIGHTING

TRAFFIC SIGNAL POSTS — TRAFFIC AND COMMERCIAL SIGN POSTS

SEVEN P & K FIRSTS! They add up to this: P & K All-Aluminum Standards, Arms and Posts do the job better, easier and at far less cost than any other "pole" of any other material or design.

WRITE FOR THE NEW P & K CATALOG . . . and use the planning and advisory services without obligation.

Pfaff & Kendall

84 Foundry Street
Newark 5, New Jersey

Subox
PROTECTS THEM ALL

Oil storage tanks or coal handling equipment...water tanks or ash collectors, metal surfaces everywhere...all are dependably protected against rust and corrosion when the SUBOX PAINT SYSTEM is used. In every case, longer life, minimum maintenance costs, and simplified future upkeep are assured.

Formulated on a rust-inhibitive, lead-suboxide base, every SUBOX & SUBALOX paint thoroughly resists corrosion...is hard, yet flexible enough to withstand rapid and frequent temperature changes; weathers well, and gives excellent protection against industrial fumes, moisture, and abrasion.

Each coat has the same tough durable lead base assuring excellent adhesion and eliminating the possibility of film separation, peeling, chipping or cracking. As the lead film wears thin, the established coat can be built to original film thickness and its life extended for another long period — no special primers or finishers required — with just one single maintenance coat.

Subox Inc.

3 Fairmount Plant, Hackensack, N. J.

Rural Sales Campaign Sells 2,383 Appliance Units

Electrical appliances filling 35 freight cars were the final result of Montana Power Co's drive to sell load to rural customers. (EW, July 13, 1953, pg 180). By offering coupons toward the purchase of appliances through dealers, the company promotion sold 2,383 units, including 718 water heaters, 653 ranges, 461 freezers, 338 water systems and 213 dryers.

For a total coupon redemption cost of $44,645, the company added load estimated to bring in $65,500 in additional annual reveue. To reach 12,268 rural customers in seven divisions, Montana Power used a road show that included an afternoon of appliance demonstrations and "The Room of Amazement" presentation in the evening.

Electric House Heating in Scotland

ALISTAIR GRANT, Scotsman Features Ltd, Glasgow, Scotland

Up in the north of Scotland, in Inverness, the first "fireless" houses in that country have been built. They are heated by electricity, the conductors drawn into tubes which are embedded in the concrete floors in a system worked out by Mr. Jack Blackburn, the city architect. The houses were built by the municipality which is so pleased with them that the system was later installed in 45 municipal three-story flats.

Installation costs in the five houses varied from £80 ($224) to £120 ($336), depending on size, averaging about £15 ($42) per kw. As against these figures the cost of constructing a chimney and fireplace in a normal municipal house is between £50 ($140) and £60 (168). The occupant of one of the houses found that the energy cost for the six winter months of lighting, hot water, cooking and heating amounted to £31 ($86.80). Others had annual bills from £40 ($112) to £50 ($140).

Energy is supplied by the North of Scotland Hydro-Electric Board. The heating installations are thermostatically controlled to maintain a comfort temperature of 70 deg F inside the houses.

The Strand That Offers a Choice of Coating Weights

How wires with the bethanized A and B coatings would look if greatly magnified.

A strand coating that is wholly satisfactory in one case isn't always the best choice in others. For this reason Bethlehem offers both an A-weight coating (equivalent to extra-galvanized) and a B-weight, which is twice as heavy. Either is available with Bethlehem's bethanized strand.

There is no difference in the quality of these two coatings. Both are highly-pure zinc, applied electrolytically. The sole difference is the amount of zinc on the wire.

Which should you select?

The A, certainly, where it will last as long as the other line components. But pick the B where pole structures and other items are designed for the longer-term jobs. This is a matter of plain dollars and cents. The B coating will last much longer than the A under similar conditions; yet it costs *very little more*. Because of this choice of coating weights, it is possible to match strand life to line life – thus effecting the greatest overall economy.

Actually, with bethanized strand, you are not even limited to two coating weights. There's a third, called C, which is heaviest of all and is recommended for extreme conditions.

So, when buying your next lot of strand, be careful to make it Bethlehem's bethanized. Then you're sure of a coating weight to meet the specific needs of the job you're planning.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHANIZED STRAND

BETHLEHEM STEEL

Chattanooga Hearing Stormy

Pro-public power witnesses contend Hoover task force is prejudiced against TVA. Moreell angrily denies charge

Public power witnesses charged the Hoover Commission task force on water resources and power with being "stacked" with members prejudiced against Tennessee Valley Authority at hearings held June 1-2 at Chattanooga, Tenn.

The commission replied that its only interest was economy.

During a sharp exchange at the June 2 session, chairman of the task force, Adm Ben Moreell, said his group had no responsibility for any promises made by President Eisenhower when he was campaigning.

Recalls Pledge . . . Herbert Bingham, secretary of the Tennessee Municipal League, had just explained that residents of states served by TVA had a right to expect the President's pledge during a campaign speech to operate TVA at maximum efficiency should be heeded by the commission in making recommendations.

Moreell leaped to his feet and said:

"I thought I had made myself clear in my opening statement. This commission is an agency of the legislative branch of the government and we are not under the jurisdiction of the executive branch. We have no reason to feel we must support the statements of the President."

Earlier pro-public power witnesses had claimed the President, Herbert Hoover, and Moreell had labeled TVA as "socialistic." They charged the commission's recommendations would be biased against the agency.

"There has been no charge of socialism by this task force," Moreell replied with heat.

Private Power Witnesses . . . During the testimony, William J. Clapp, president of Florida Power Corp, said the task force should recommend that the government get out of the power business and discontinue appropriations for starting new power developments. He urged a study to determine what projects could be stopped immediately and what projects should be completed.

James M. Barry, chairman of the executive committee of Southern Co, declared that in his opinion there was no limit to the size of hydroelectric projects that could be built by industry if they were economically sound. He cited as an example the $100-million Coosa River development proposed by Alabama Power Co.

Barry and another utility witness, Arthur M. Williams, Jr, counsel for South Carolina Electric & Gas Co, also criticized the preference clause.

At the hearings George R. Dempster, Knoxville mayor and president of Citizens for TVA, suggested private power interests adjoining the TVA area stop throwing "bricks of criticism" at TVA and use those "bricks" to build a monument to it.

He charged that members of the task force were hand-picked for their anti-public power policies.

"It so happens," replied Moreell, "that I am the one who proposed them."

Leading proponent of TVA expansion, Gov Frank Clement of Tennessee, had this to say at the hearings:

"So long as I am governor of Tennessee, I am not going to be a party to private industries who could put us back to where we were before TVA." He recalled that people of the TVA area voted out the private power companies half a generation ago.

"Today we are ringed by private power companies who under the sheep's clothing of an offer to provide for the valley's future power needs," he said, "would apply the wolf's fang to break the power yardstick set up by TVA and return this section to the old order of high rates and power scarcity."

The Chattanooga hearings are the third in a series of five. Fourth gets under way today, June 14, in New York. The task force on water resources and power is part of the Commission on Organization of the Executive Branch of the Federal Government which is headed by ex-President Hoover.

Price Is Assistant BPA Administrator

Appointment of Byron L. Price, chief administrative aide for Oregon's largest municipal electric system, as assistant administrator of Bonneville Power Administration, and advancement of Orren Brownson to the post of assistant to the administrator are the latest top personnel changes in the big Pacific Northwest federal transmission agency.

Together with other recent staff additions, principally the result of departures of top officers loyal to public power philosophies of the Roosevelt-Truman era, the changes soon will be reflected in BPA outlook compatible with policy laid down by President Eisenhower, Secretary of Interior Douglas McKay, and Undersecretary Ralph A. Tudor, and Congressional directives.

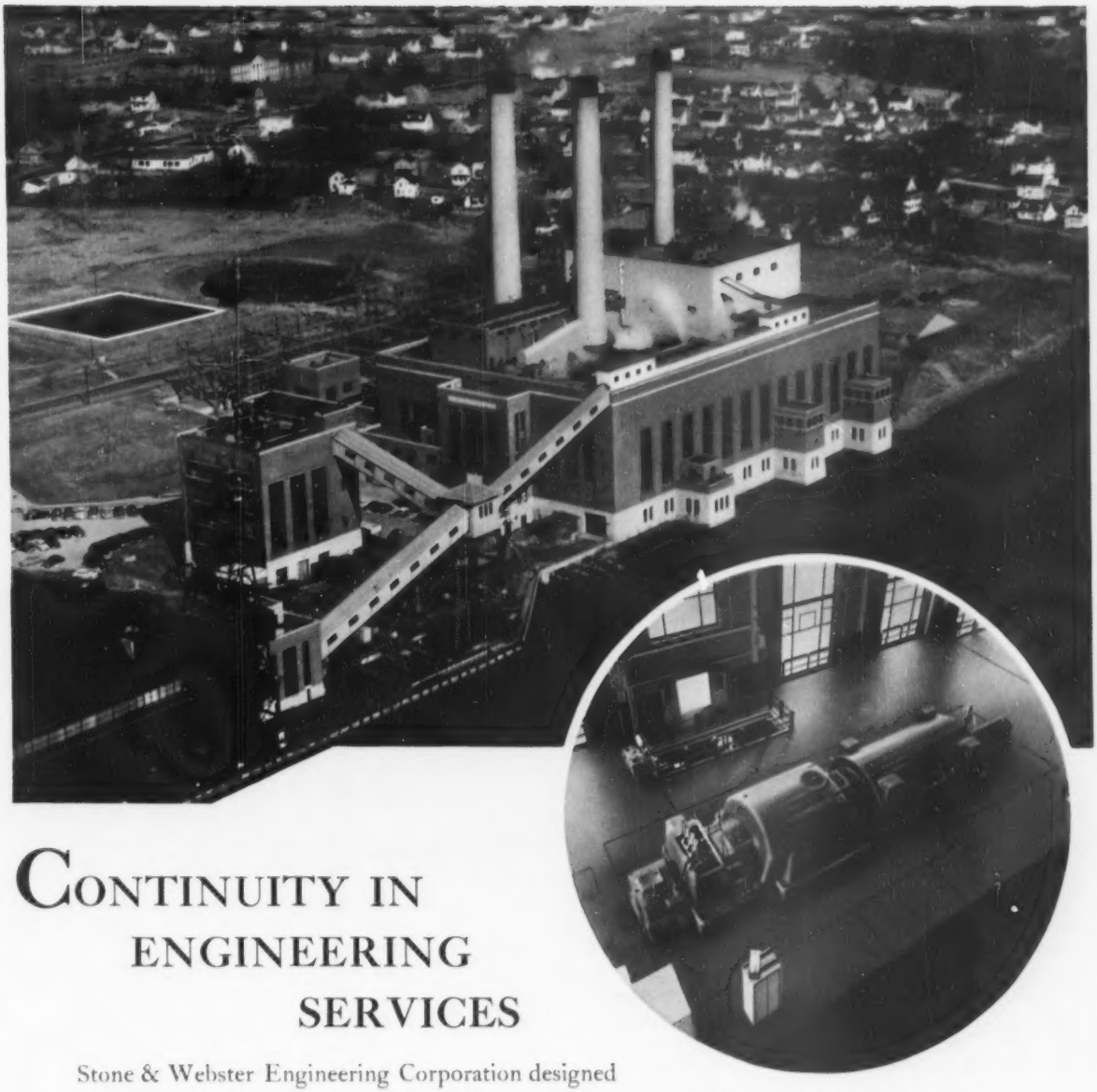
Price is the most important oppointee at BPA since Administrator William A. Pearl took over from Paul J. Raver. He succeeds John D. Davis who has been on the job for two years and plans to leave in mid-June to go into private business.

Pearl's new assistant has been chief

BYRON L. PRICE

administrative aid to the superintendent of Eugene Water and Electric Board for over a year. He has been handling work related to the municipal system's power supply proposals linked to the Cougar Dam partnership plan and others. Prior to that he was with Army Corps of Engi-

(*Continued on page* 259)



CONTINUITY IN ENGINEERING SERVICES

Stone & Webster Engineering Corporation designed and constructed the first unit of Somerset Station for Montaup Electric Company at Somerset, Massachusetts in 1924. Three years later the Engineering Corporation designed and built a second unit; in 1942 the first large high pressure controlled circulation boiler in this country and a third unit were installed; in 1947 a fourth unit was added and a fifth unit is now on the line.

Four-fifths of all the construction work of the Corporation amounting to well in excess of three billion dollars has been in the form of "repeat orders" from clients.

With the fifth unit shown above, Somerset Station has a net capability of 210,000 kilowatts

Write or call us for detailed information as to how our engineering, design, construction, report and appraisal services may be of assistance to you.

STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY *of* STONE & WEBSTER, INC.

New York Boston Chicago Pittsburgh Houston San Francisco Los Angeles Toronto

Endless Energy . . .

THANKS TO BATTERY POWER!

Only with Gould Planté power can you get so much for so little. PURE LEAD positive plates give these batteries an almost endless source of energy for telephone, switchgear, alarm and emergency applications. In fact, they maintain top capacity years longer than ordinary batteries. They're by far the lowest cost standby batteries you can buy. Standardize on Planté.

Specify
GOULD PLANTÉ—
The Aristocrat of
Stationary Batteries

GOULD *INDUSTRIAL BATTERIES*

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Always Use Gould-National Automobile and Truck Batteries

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C. W. WOOLDRIDGE

L. A. BYRON

Texas P&L Changes Revealed

President Lynch replaces John W. Carpenter as board chairman. Wooldridge and Byron named vice presidents

Texas Power & Light Co has announced the appointment of a new chairman of the board and two new vice presidents.

W. W. Lynch, president and general manager, was elected chairman of the board to succeed John W. Carpenter, who has resigned. C. W. Wooldridge and L. A. Byron were appointed vice presidents.

Lynch will continue to serve as president and general manager and Carpenter, who will remain on the board of directors, will also serve as chairman of the company's executive committee.

Started as a Rate Clerk . . . Wooldridge, who has been assistant to the president since January, 1953, began his career with Texas P&L as a rate clerk in its Dallas headquarters office. After serving in several posts in the commercial, operating, and personnel departments, he became executive assistant in March, 1952.

Byron, who became assistant manager of operations for the utility in March, 1953, assumed full responsibilities of that department in August of that same year. He became associated with Texas P&L in 1926, serving as power plant engineer and then as assistant plant superintendent until 1930. He then worked with Kansas Power & Light Co and Missouri Utilities Co. He held the position of executive vice president of the Missouri company when he rejoined Texas P&L.

Lynch was named president of Texas P&L two years after he was named executive vice president in 1947. He was made a vice president in 1936.

Texas P&L Veteran . . . The retiring board chairman started his utility career in 1900 when he joined Corsicana Gas & Electric Co, which later became a part of Texas P&L. He was named general manager of the latter company in 1919 and president and general manager in 1927. He was made chairman of the utility's board in 1949.

Joins Roller-Smith as VP

Richard C. Lipps has joined Roller-Smith Corp, Bethlehem, Pa., as vice president in charge of marketing. Lipps, who has had wide experience in the electrical industry, comes to Roller-Smith from General Electric Co, where he served as eastern regional manager of the Trumbull Electric Department, Plainville, Connecticut.

Turner Advanced

Ohio Power official assumes executive post with American G&E Service. Prentice elevated

Several executive changes have been made in the American Gas & Electric System.

Harold Turner has been appointed executive vice president of the American Gas & Electric Service Corp. For the past eight years he has served as vice president and general manager of Ohio Power Co, an electric operating subsidiary of American Gas & Electric Co. His new appointment becomes effective July 1.

Relinquishes Executive Post . . . Turner replaces Graham Claytor as executive vice president in charge of operations for the seven-state American G&E System. Although Claytor retires from that post June 30, he will continue as a member of the American G&E company's board of directors and executive committee.

A. N. Prentice, assistant general manager of Ohio Power, succeeds

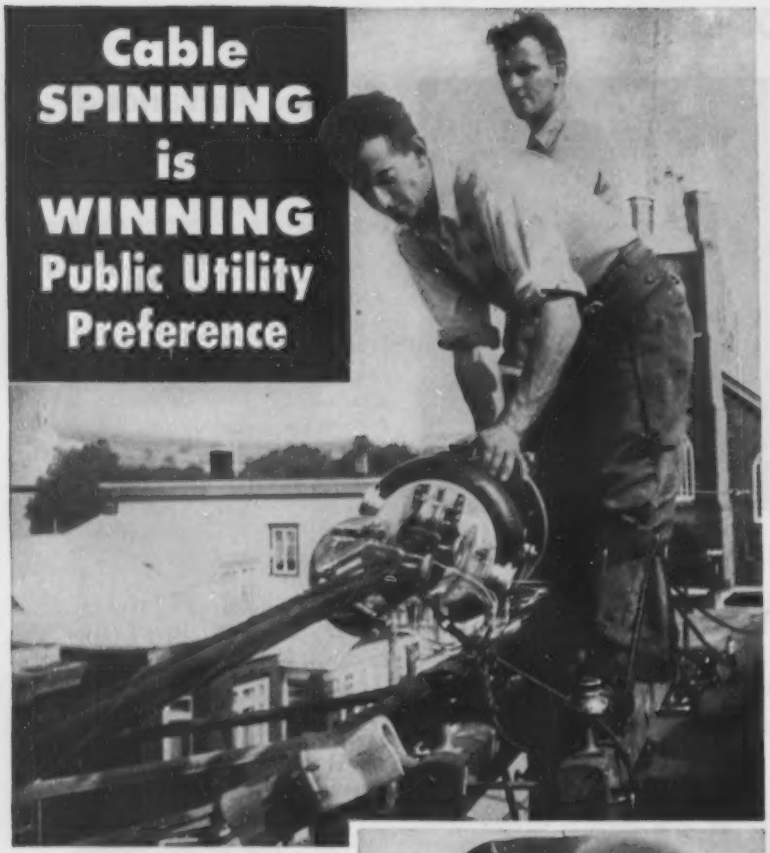
HAROLD TURNER

Turner as Ohio Power's vice president and general manager.

Turner, a native of Canada, joined AGE in 1926 as an engineer. In 1934 he was made assistant to the vice president and chief engineer. He was named assistant general manager of Ohio Power, advancing to vice president and general manager in 1946.

He also is a director of Ohio Power

Cable SPINNING is WINNING Public Utility Preference



More and more public utilities every day are turning to the Neale Model "K" Cable Spinner—specially designed for economical and efficient power line use. And here are some of the benefits . . .

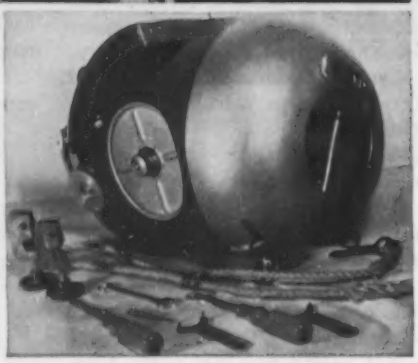
It actually costs much less to install spun cable than pre-assembled cable. And, of course, spun cable saves valuable space in open-wire construction in congested areas.

Light weight single conductor cables may be spun in lengths three times as long as pre-assembled cables . . . to save splices and installation labor.

Spinning reduces cable inventories, because 1/c, 2/c and 3/c cables can be spun in the field as required.

Cable spinning provides a big margin of extra protection against storm damage . . . and has proved invaluable in emergencies of all kinds.

You're invited to send for full technical details on the Neale Model "K". Just drop a line to Cable Spinning, Topeka. *Neale Spinning Wires available in seven different types and sizes.*



Main illustration shows spinning of cable in Canada. Inset is close-up of the Neale Model "K" Cable Spinner, with accessory tools. Model "K" spins a single cable or three 2" cables into a compact triangular pattern. Strand lies in groove formed by two top cables.

HOW IT WORKS. Drum rotates when its two friction drive wheels respond to pulling of wire. Drum revolves once when 13" of wire is pulled — regardless of condition of strand. Drum carries two spools of wire, spaced to spiral 6½" apart for ample cable support. Magnesium castings used wherever possible for lightness and strength. Weight is only 36 pounds. Length 18½", 12" diameter, 4¾" wire exit.

THE WORLD IS SPINNING—TOO! PHONE 2-7234-5

Cable Spinning Equipment Co.

3100 TOPEKA AVE. TOPEKA, KANSAS

A. N. PRENTICE

as well as the Service Corporation, Wheeling Electric Co, an AGE subsidiary, and the Ohio Valley Electric Corp, and a director and vice president of Central Ohio Light & Power Co, another AGE company.

Began as Engineer . . . Prentice started with Ohio Power as an engineer in 1928. After serving in various posts, he became assistant to the vice president and general manager in 1949, assistant general manager of another AGE company, Indiana & Michigan Electric Co, in 1950 and assistant general manager of Ohio Power last October.

Claytor has been with the AGE System and its predecessor companies for more than 47 years, 32 of which he has served in executive capacities. He became executive vice president of the Service Corporation last December. In addition, he is a vice president and director of all AGE operating companies as well as a member of other smaller subsidiaries.

Minnesota M&M Makes Executive Appointments

Minnesota Mining & Manufacturing Co has announced the promotion of George J. Wachholz as comptroller and several executive appointments in its International Division.

The International appointments include the election of Kenneth J. Shea, general sales manager of the division since last February, as vice president of sales. Edward R. Newcomb, export sales manager since 1953, was named vice president of export sales. E. Harlan Church, assistant treasurer

of the parent company, was appointed treasurer of the division. Eugene F. Kindler was promoted from chief cost accountant to assistant treasurer of the division.

Prior to his present assignment, Wachholz served for four years as assistant comptroller. He joined 3M in 1936.

ROY N. DREIMAN

PCEA President

Dreiman, a vice president of Coast Counties G&E, takes over July 1 as group's head

Roy N. Dreiman, vice president and treasurer of Coast Counties Gas & Electric Co, will take office July 1 as new president of the Pacific Coast Electrical Association. Dreiman, a past vice president of the association, succeeds J. H. Pengilly of Square D Co of Los Angeles.

New vice presidents elected by the group are C. W. Goodwin, General Electric Supply Co, San Francisco, and Sam Scott, Graybar Electric Co, Los Angeles.

Dreiman, whose utility career began in 1915, went to San Francisco in 1928 to accept a position with Pacific Public Service Co, parent of Coast Counties G&E. Since then he has served both companies in executive capacities, advancing to his present post in 1948.

•

Samuel Rosenbach, who has filled various engineering posts since joining Duquesne Light Co in 1922, has been

Corrosion can't get under this conduit's skin!

Electrical conduit stays *free of corrosion* when you wrap with "Scotch" No. 22 Vinyl Plastic Electrical Tape.

That's how Husselman Electric Company used it recently in an electrical installation for the General Chemical Division of Allied Chemical and Dye Corporation, Painesville, Ohio.

You see, the pressure-sensitive adhesive of "Scotch" No. 22 anchors every square inch of tape to the conduit. Should the tape be accidentally cut or damaged, corrosive vapors and liquids cannot penetrate or travel between tape and conduit. Damage is confined to the immediate area and cannot "spread."

"Scotch" No. 22 is flexible, too! That's why it gives you the same continuous barrier on curved connecting lengths as on straight sections.

Try it on your next job! "Scotch" No. 22 is available in ½", ¾", 1" and 2" widths in 36-yard rolls.

The term "Scotch" and the plaid design are registered trademarks for the more than 300 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining and Manufacturing Company, St. Paul 6, Minn.** — also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

SCOTCH BRAND Electrical Products

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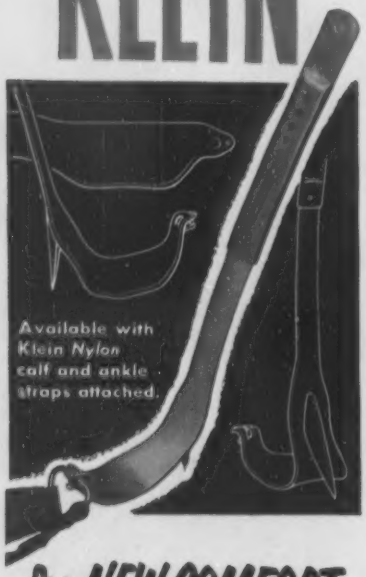
KLEIN



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Meet the big new favorite—Klein Climbers fully shaped to the contour of calf and ankle. That means a firmer, closer fit . . . a greater measure of safety. There's a new shape to the extra-wide stirrups also, for more comfortable arch support. Klein Climbers are made of forged steel, individually tempered and tested—aluminized for weather protection. Matched in pairs—adjustable length patterns 15 to 18 inches, specify 1945-ADJ—fixed length patterns 15 to 18½ inches, stock sizes specify 1945.

KG NO. 1 GAFF GAUGE
Keep this precision gauge handy for a safety check on proper spur pitch. Plated steel—packed in durable plastic case.

1901-MG GAFF GUARDS
Protect the all-important spur of your climbers with this new Klein gaff guard. First quality leather with spring clip.

Instructions for sharpening gaff included.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York.

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appointed electrical engineer in the utility's Engineering and Construction Division. In other divisional appointments, **W. A. Conwell,** who has served as structural engineer and general engineer, was made structural engineer. **E. M. Gue,** formerly electrical station engineer, was made electrical design engineer.

F. G. TREAT

Riley Stoker Names Treat VP of Its Detroit Plant

F. G. Treat, manager of Riley Stoker Corp's Detroit plant, has been appointed vice president in charge of that plant.

Treat's association with the Worcester, Mass., corporation started in 1933 as a field service engineer. In 1935 he was made chief engineer of the Fuel Burning Division, transferring in 1942 to the Detroit plant as plant manager. He was graduated from Yale University's Sheffield Scientific School in 1928.

•

Wilber A. Carter has retired as technical engineer of power plants for Detroit Edison. With the utility 41 years, he will continue as a consultant on the River Rouge generating plant project and Detroit Edison's nuclear power development department.

Edgar C. Metcalf, who has served as project engineer for the Rock Island Dam and power plant expansion project of the Chelan County PUD, has been named power supply chief for the PUD with headquarters at Wenatchee, Wash. He will have charge of preliminary work on the PUD's pro-

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Every bolt-and-nut assembly locked with PALNUT Lock Nuts stays tight, despite weather, wind, stress and vibration. PALNUTS, tightened on top of the regular nuts, prevent loosening and falling off. Very low in cost—easily, speedily applied—require little space—may be used on new or existing assemblies. Hot dip galvanized, silicon bronze and other materials and finishes. Stocked by all leading pole line hardware manufacturers.

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TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

posed Rocky Reach Dam on the Columbia River and a Wenatchee-Chiwawa River project.

JAMES M. DARBAKER

Copperweld's Senior VP

Appointment of James M. Darbaker as senior vice president of Copperweld Steel Co has been announced by Frank R. S. Kaplan, president. Darbaker, who will make his headquarters in the company's executive offices in Pittsburgh, also was elected a member of the board of directors. Widely known in the steel industry, Darbaker has filled various administrative, production, and sales positions with the United States Steel Corp for 34 years.

OBITUARY

Fred V. Larkin, 71, professor emeritus of mechanical engineering at Lehigh University, died last month at Bethlehem, Pa. While serving Telluride Power Co as an engineer, he conducted the building of one of the first high voltage electric transmission lines over the Continental Divide in 1906. Larkin, who graduated from University of Wisconsin and received a master's degree from Lehigh, was made head of the latter institution's mechanical engineering department in 1919. He was director of curricula in mechanical and industrial engineering when he retired.

Michael L. Hanley, 73, chief investigator for the Pennsylvania Public Utility Commission since 1936, died May 29 at Philadelphia.

. . . AND HL&PCO uses Control Corporation Super-Trol and Telemetering Systems

The rapid growth of the Texas Gulf Coast is being paced by HL&PCO's tremendous expansion of the area's electric power resources. Investment of approximately $90,000,000 in the three year period 1954 through 1956 will increase the company's present generating capacity by more than a half-million kilowatts, or almost 70%. Thus adequate, dependable electric power for the burgeoning needs of industry and business is assured, and the region is abundantly provided with an important element in its continued progress.

SUPER-TROL ELIMINATES GUESS-WORK

This 40′ x 60′ air-conditioned dispatching office has 4 Control Corporation supervisory panels for 10 sub-stations installed and in use. In addition to the present equipment the HL&PCO has more Super-Trol panels on order to meet the demands of their growing community.

● Let us mail utility bulletin AA-2 to you. It shows how supervisory control and telemetering can fit into your power picture.

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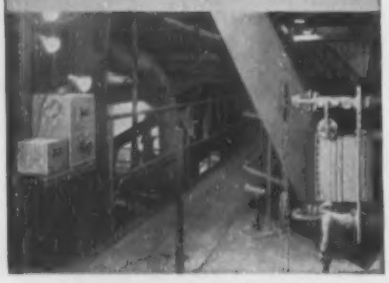
NOW You Can *See* Where You Can't *Look*

5 YEARS of CONTINUOUS OPERATION PROVE Dependability OF DIAMOND "UTILISCOPE"
(WIRED TELEVISION)



"UTILISCOPE" camera at drum elevation SEES actual boiler water level.

In 1948, Tidd Plant of Ohio Power Company (subsidiary of The American Gas & Electric Company) installed a Diamond "Utiliscope" so that the operator at the control panel could SEE the boiler water gauge several floors above. The camera location (adjacent to the big boiler drum) is hot and dusty. Auxiliary machinery causes vibration. The installation (including the original camera tube) has been in continuous use . . . 24 hours a day . . . 7 days a week for over 5 years, with very little maintenance. This is the first system of industrial television purchased in the U.S. and is still in continuous operation.

Probably there are places in your plant where you can use the DEPENDABLE "Utiliscope" (wired television) . . . the great new industrial aid. It is saving money and improving operations in steel mills, power plants, foundries, coal mines, and a wide variety of manufacturing plants. Use the coupon below.

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SINCE 1903, DIAMOND HAS MANUFACTURED QUALITY EQUIPMENT FOR INDUSTRY

BOOKS

Received Since May 5

Electric Traction Handbook (Control) by R. Brooks. Published by Pitman Publishing Corp, New York 36. 322 pages, illustrated. Price $6.50

Applied Atomic Energy by K. Fearnside, E. W. Jones and E. N. Shaw. Published by Philosophical Library, New York. 156 pages, illustrated. Price $4.75

Elektromagnetische Wellen. By K. W. Wagner. Published by Verlag Birkhauser, Basel, Switzerland. 267 pages, illustrated. Price (bound) Francs 33.30

Engineering Analysis. By D. W. Ver Planck and B. R. Teare, Jr. Published by John Wiley & Sons, Inc, New York 16. 344 pages. Price $6.00

Transformers

Elektrische Maschinen. Band III Die Transformatoren. By Rudolph Richter. Published by Verlag Birkhauser, Basel, Switzerland. 321 pages, illustrated. Price 26 Swiss Francs

Well-known as a transformer theory and design text before 1932 this third volume of the Richter series on electrical machines has now been reproduced photo-mechanically. To bring the treatment up to date the author has inserted a 24-page supplement and included 100 new references to literature (almost exclusively European) from 1932-1953 to enhance the 168 of the earlier edition. The present volume, in German, contains many equations, charts and connection-diagrams not found elsewhere.

Nuclear Research

Applied Atomic Energy. By K. Fearnside, E. W. Jones and E. N. Shaw. Published by Philosophical Library, New Yok 16. 156 pages, illustrated. Price $4.75.

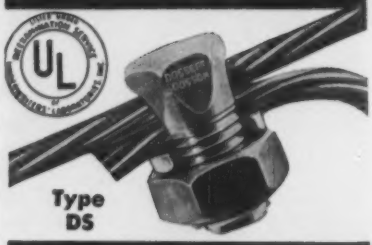
Authors of this book are associated with Isotope Developments Limited, a British public corporation to foster use of radioactive isotopes. Most of the book is devoted to this objective and pertains specifically to the fields of pure research, biology, medicine, agriculture and industry. Types of reactors are described in one chapter and at this point the authors are somewhat skeptical of early attainment of nuclear power on an economic level.

Aids Study of AC Machines

The Performance and Design of Alternating Current Machines. By M. G. Say. Distributed by The British Book Centre, Inc, New York 22, N. Y. 636 pages, illustrated. Price $6.75.

This book, published in England by Sir Isaac Pitman & Sons, Ltd. was reviewed May 17, 1954, p 253. It is available at the above distributing center.

JOINED for LIFE with *DOSSON* SERVICE CONNECTORS



Type DS

The choice of connectors is wide, but there's a big difference when you choose a Dosson. Years of testing under the worst weather and corrosion conditions give undisputed proof of Dosson's permanent grip. Makes quick, simple, efficient connections for solid and stranded conductors in sizes No. 14 to 1000 MCM. High contact pressure between conductors assures maximum security . . . eliminates maintenance. Check these important Dosson features:

1) High translation of torque by low coefficient of friction
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SINCE 1904

Lignite Fires Plan

(*Continued from page* 114)

unit. Service water, cooling water, potable water, station air, compressed air, and instrumentation are interconnected for the entire three-unit station. The station air, instrument air, and vacuum cleaning piping systems are made of aluminum, and the insulating material for outdoor piping systems is covered with sheet aluminum.

Cooling water for the Sandow plant is obtained from an 850-acre lake created artificially near the plant site. An earth dam more than a mile long provides a bank on the low side. Water is pumped into the lake from Little River, about 12 miles away, through a 36-in. reinforced concrete pipeline. A dyke divides the lake into two ponds connected by a 6,800-ft canal. The smaller pond receives the condenser water discharge, and the canal returns the water to the larger pond where it cools for re-use.

The generator busbar is of square extruded aluminum bar covered by a circular aluminum housing. It is connected to an 8-in. exposed aluminum bus which continues to the 13.8-kv switchyard. The switchyard consists of a double-bus system, with each main bus of 12-by-12-in. aluminum extrusion capable of carrying 12,000 amp. Both buses are fed by each of the generating units. Five potline feeders, fed directly from either of the switchyard buses, extend to the smelting plant.

Sandow Power Plan can feed power into Texas Power lines over a 138-kv tie. Or, additional power needed by Alcoa can be supplied from the utility's system.

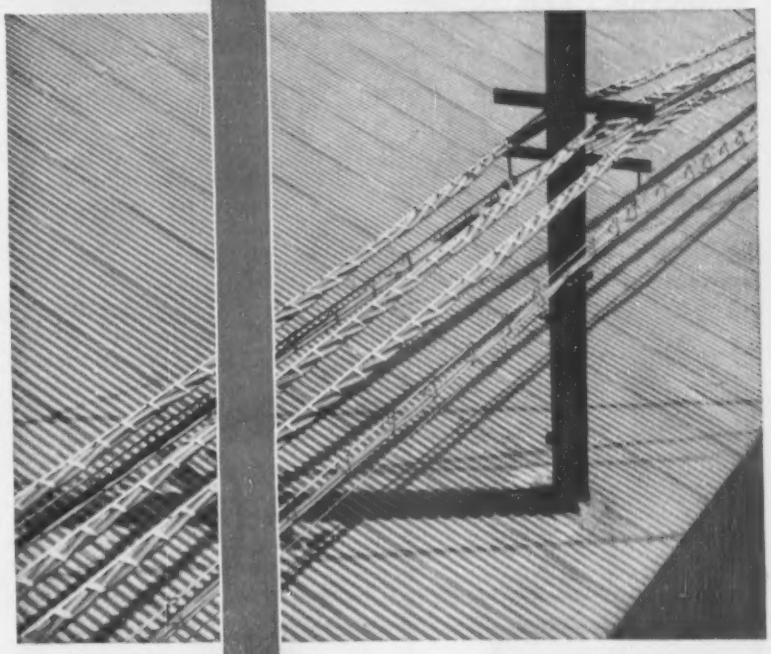
REA Needs to Triple in '75

Estimated power requirements of electric systems financed by the Rural Electrification Administration are expected to nearly double by 1963 and more than triple by 1975, according to the Department of Agriculture. REA borrowers' systems are expected to have their input reach 27.5 billion kwhr in 1963 and 45 billion kwhr in 1975. This compares with 14 billion kwhr in 1953. Estimates are part of a study initiated by Ancher Nelsen, REA administrator, to make plans to meet farm electric load growth.

an ACCO product

PAGE

Stainless Steel Strand



for Severe Service Conditions

• The photograph above shows just one example of how PAGE Stainless Steel Strand is ideal for applications involving rugged service conditions.

Here, PAGE Stainless Steel Messenger Strand, with stainless steel lashing tapes, supports perfectly a series of insulated conductors through a highly corrosive fume area above a steel cleaning house.

PAGE Stainless Steel Strand is equally versatile for ground, guy and catenary applications. Its higher tensile strength, corrosion-and-abrasion resistance, elastic limit and strength-to-weight ratio make it your first choice! And—its lower cost *per year* of use means long-range economy.

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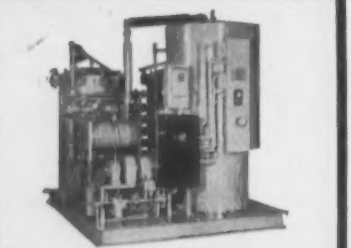
reduces costs of

1 TRANSFORMER MAINTENANCE

2 OIL REPLACEMENT

With this 300 g.p.h. mobile Hilco Reclaimer the City of Tacoma, Washington, purified 100,000 gallons in three months at a saving of $20,000.



Cincinnati Gas & Electric Company reports an annual saving of $4,000 with this stationary Hilco Reclaimer.

The HILCO HYFLOW Oil Reclaimer combines a duplex fullers earth filter with a vacuum vaporization system to remove water, sludge, soluble oil oxidation products, paint, bushing compound, metallic soaps, etc. Oil is restored to new oil values as indicated by Neutralization Number, Interfacial Tension, and other tests.

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Vault Transformers

(*Continued from page* 117)

3,780 cfm of free air. Heavy-duty ball-bearing motors were used on the fans because of unfavorable experience in maintaining motors with sleeve type bearings.

Although the air streams from the fans were directed on the transformers, the fans were positioned to augment the flow of natural air through the vault. This arrangement proved satisfactory for transformer cooling, and the velocity of the air discharged through sidewalk gratings was not objectionable to pedestrian traffic.

Get Good Results . . . The figure gives operating information for two days when the load curves of the transformers showed the greatest variation and ambient air temperatures were relatively high. Test results show that although the control was mounted externally to the transformer case, it could be set to start fans as a function of top oil temperature.

Because of movement in the vault and the location of the control, stopping the fans is a function of the transformer oil and ambient air temperatures. This limits the duty on the fans to periods when they are required. However, it may contribute to longer periods of cyclic operation under certain combinations of load and ambient air temperatures.

The transformer oil temperature at which the fans start is approximately 65 C for average summertime air ambients. Decision to start the fans at this temperature was based on the belief that the ventilation should limit the temperature rise of the transformers during periods of increasing load and rising ambient air temperatures. With the fans starting at this temperature and the control set for minimum differential, the maximum and minimum operating times have been approximately 16½ and 7 hrs per day respectively, the average being 10 to 12 hrs during the summer.

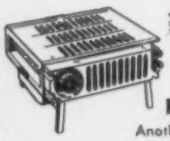
Seward Asks FPC Permit

City of Seward, Alaska, has asked Federal Power Commission for a preliminary permit for a proposed hydroelectric project on Ptarmigan Creek on Kenai Peninsula. Project would have initial capacity of 1,500 hp.

Specify these METER TESTING ACCESSORIES *Now in use by Leading Utility Companies*

G-50 METER TEST KIT

This equipment is extremely small and compact. Designed for the testing of socket type meters of 5, 15 and 50 ampere capacity, 2 and 3 wire single phase.

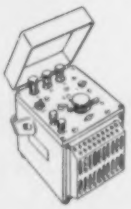


TRR RELAY LOAD

Another resistance load in a series which we believe to be radically different in design and construction from any devices heretofore manufactured for this purpose.

TYPE GA METER TEST KIT

Designed to reduce the weight of portable equipment to the lowest possible limit. Total weight, less rotating standard and leads is 12½ pounds. 18" long, 7¾" wide and 10½" high.



H-50 ARTIFICIAL LOAD

This was designed for general purpose testing of all meters up to 50 ampere capacity. Like all other loads of our manufacture, the H-50 load is rated for continuous duty. Weight 12 lbs. net.

Write for Complete Information

EASTERN SPECIALTY CO.

PHILADELPHIA 40, PA.

BPA Personnel Changes

(*Continued from page* 248)

neers for nine years, on active duty during World War II and later as a civilian employee at the Portland district office where he was at one time administrative assistant to Tudor, then Portland district engineer.

Price was chief of the real estate division when he accepted the Eugene post. A native of Laurel, Mont., he first studied law and then switched to engineering and was graduated from Montana State University.

Brownson moves up to take over responsibility coordinating BPA activities with other government agencies, public and private utilities, and the public—some of which he has been handling as acting assistant since March 15.

It was more or less expected that eventually Brownson's role as a top policy making member of Pearl's staff would be recognized formally. He joined BPA in September, 1953, as director of the division of general services in charge of purchasing. But as the first Eisenhower appointee he also has been influential in the selection of personnel.

Pearl Defends BPA's Sale of Right-of-Way for Line

Cash sale of the federal government's interest and right-of-way for a Bonneville Power Administration transmission line to California Oregon Power Co continues to be a controversy in the Pacific Northwest where critics of the Eisenhower power policies seek to picture the transaction as proof the Administration wants to emasculate the Columbia River system.

Charges by Oregon's State Sen Richard L. Neuberger, who is the Democratic nominee for U. S. senator against incumbent Sen Guy Cordon, have sought to label the deal a "bargain basement sale" of public property to private investors. The question was touched upon by Interior Secretary Douglas McKay in his May 10 TV-radio talk in Portland and again May 26 by Bonneville Power Administrator William A. Pearl. The BPA chief went to greater length in explaining that "the integrity of the BPA trans-

(*Continued on page* 262)

PLUGMOLD Speeds Outlet Wiring

For your next outlet job, use Plugmold! One installation will SHOW you that Plugmold is the easiest, fastest, cheapest way to provide the many outlets your customers WANT! Send for the Plugmold booklet . . . better still, get a 20-foot Introductory Package today!

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WIREMOLD one-piece construction **MAKES WIRING EASIER**

Wiremold's one-piece construction makes installation easy . . . requires no special tools or gadgets. Four sizes for every wiring job, whether new wiring, or modernizing present wiring. Write for full information.

WIREMOLD products are backed by a firm guarantee. See page 7 of Wiremold Catalog No. 19.

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Control

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Here is automatic control for street lighting which renders trouble-free service, without adjustment, throughout the seasons of the year. A photoelectric relay which employs the finest components together with a simplified design in order to bring to you many years of satisfactory performance without maintenance.

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SPECIFY

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EXPANDING ANCHORS

GRIP-TITE MANUFACTURING CO.
WINTERSET, IOWA

"Pioneers in the Anchor Field"

Customer Bills

(*Continued from page* 122)

A survey from 12 companies of the time lag between readings and billings, presented by John H. Eddy, California Oregon Power Co, Medford, Ore., showed the period ran from 2.2 to 12 days. The report indicated that all companies use means of transportation from ferry boats to company cars to deliver meter books. Almost all companies reported arranging their meter book accounts so that reading could be completed in one day.

William H. Prentice, California Oregon Power, detailed the story of his company's preparation and handling of a successful general rate case. Having chosen the method of presenting its case, the company prepared the exhibits. Actual operating results were adjusted to normal conditions, using as test periods the two years ended March 31, 1953. To keep tabs on the progress of the work, a weekly report on earnings adjustments and special studies for its rate application were required. Operating revenue deductions were determined by analyzing daily production of its hydro plants for 20 years to get the amount of power purchased in a normal year.

After spending almost $50,000 in its own printing plant for copies of exhibits and testimony, Copco delivered the information to the commission at least six weeks before hearings began. Once the increase was granted, customers were prepared for the increase. Bill stuffers advising of the hike and reasons for it were included in the program, said Prentice.

Tom Chambers, British Columbia Electric Co, Vancouver, was elected vice chairman of the section.

REA Uses Special Funds

For the first time since 1950, Rural Electrification Administration has drawn upon and is using the contingency rural electrification authorization provided by Congress. Agriculture Department has reported REA has drawn down $38 million of the $45 million contingency fund authorized by Congress for fiscal 1954. It is now expected REA electrification loans for fiscal '54 will reach $165 million.

FINANCIAL BRIEFS

Kentucky & West Virginia Power Co has changed its name to Kentucky Power Co . . . **Savannah Electric & Power Co** has received Georgia Public Service Commision approval to sell privately 25,000 shares of its common stock at not less than $19 a share . . .

Wisconsin Hydro-Electric Co sold $300,000 first mortgage 3¾% bonds due 1972 to Berkshire Life Insurance Co.

Kidder, Peabody & Co sold quickly a secondary offering of 28,000 shares of common stock of Iowa-Illinois Gas & Electric Co at $30.75 a share.

New York State Electric & Gas Corp has received New York Public Service Commission approval to buy the electric system of the Village of Port Byron for about $75,250. . . **Southern California Edison Co's** Pres Harold Quinton told the New York State Society of Security Analysts recently that higher dividends on the company's common stock "are in prospect" if the company obtains the increased rates it is seeking and if earnings are not otherwise adversely affected.

Commonwealth Edison Co will distribute on Aug. 1 to holders of Edison common of record on June 23 one share of Northern Illinois Gas Co common stock for every 25 shares of Edison common held.

Senate Finance Committee has voted to eliminate the 2% penalty tax on consolidated returns of regulated public utilities.

Georgia Court Refuses To Halt PSC Hearings

Fulton Superior Court Judge Virlyn B. Moore has refused to halt hearings ordered by the Georgia Public Service Commission in an attempt to get lower rates for Georgia Power & Light Co customers. He denied injunctions requested by GP&L and the Georgia Power Co to annul a ruling by the PSC.

The judge commented that he doesn't know whether the PSC can do what it apparently is attempting to do but said he would not presume it would do anything illegal.

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MODERN
Street Lighting
...THOMPSON Servisafe
POLE UNITS PROVIDE OUTSTANDING
ECONOMY . . . SAFETY . . . BEAUTY
Efficient, safe, ground-level maintenance for street and parkway luminaires is guaranteed with Thompson "Servisafe" pole units. Single and double-arm models are available for use with all standard pendant type lighting fixtures.
Featuring a patented disconnecting and lowering mechanism, these easy-to-operate assemblies completely eliminate pole climbing. There are no electrical hazards for maintenance men because the lowered luminaire is "dead".
In addition, the new Thompson "Servisafe" pole units permit greater luminaire mounting heights, long recognized as necessary for improved area illumination but restricted to date by the available types of servicing equipment.
A variety of new, tapered steel and aluminum poles can be supplied to meet every application.
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Lineman's

GLOVE BAG

Protects the lineman's gloves when not in use and provides a means of keeping them within reach for when needed. Heavyweight canvas construction. 8" wide by 15" long. Snap on back for attaching to body belt.

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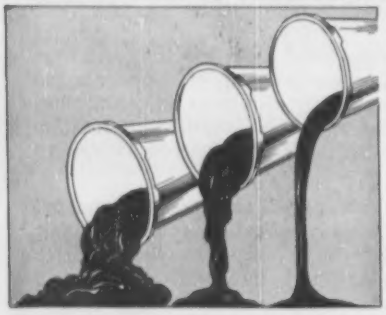

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MINERALLAC ELECTRIC COMPANY

25 North Peoria Street—Chicago 7, Illinois

MINERALLAC

Pearl Defends Sale

(*Continued from page* 259)

mission grid system will be maintained." Earlier he had stated the sale to Copco was an exceptional situation and not to be construed as Interior policy. The question has reoccurred as the result of Pacific Gas & Electric Co's offer to buy the Central Valley Project transmission system in California.

Pearl told a Portland commercial club May 26 the sale of BPA's materials and land between Yamsay and Klamath Falls in Oregon, which involved Copco's payment of $2,895,834.52 instead of a five-year installment plan originally announced in the June, 1953, agreement, did not mean other units were for sale.

Pearl declared:

"The line was to have been built to deliver power to the Klamath Falls area served by the California Oregon Power Co, familiarly called Copco. We serve our customers at any point they designate, if it is economically feasible to do so. Copco's analysis of its own system operations determined that a Yamsay interchange was the most feasible. Bonneville no longer had any need for the Klamath Falls line. We had no other customers in that area. Thus the federal line was stopped at Yamsay, with the understanding that BPA would furnish to Copco at this point to compensate the company for power Copco is to deliver for BPA's account to the new nickel smelter at Riddle. We sold the materials and right-of-way from Yamsay to Klamath Falls and this was not a bargain basement sale. Copco paid the federal government in cash—every cent it had advanced for this line, including interest and overhead expenditure."

British Columbia to Ask Power from NW Projects

British Columbia will demand a share of power from the Libby Dam in Montana and other Columbia River hydroelectric projects planned in the United States.

This was announced by Lands and Forest Minister Robert Sommers last month in Victoria, B. C., after he had met with the Columbia River Basin Development Advisory Committee to iron out problems regarding payments

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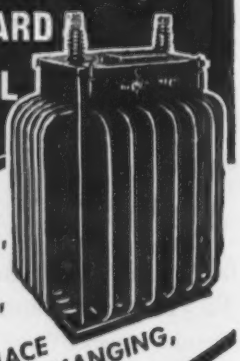

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for upstream and downstream benefits from a number of power dams in British Columbia and the United States.

These payments were discussed in terms of the Libby project which will flood about 40 miles back into Canada.

The results of the study now being undertaken by an engineering subcommittee, the minister said, will "set the pattern" for other projects, and may be applied to Seattle City Light's Ross Dam on the Skagit River, and later to the proposed $400-million Mica Creek Dam.

POWER BRIEFS

● Following new units have been put in service: 66,000-kw unit at Pennsylvania Water & Power Co's Holtwood, Pa., plant; 70,000-kw turbine generator at Dallas Power & Light Co's Griffin Street plant; the second of two 200,000-kw units at Ohio Power Co's Muskingum River Plant; and 66,000-kw generator at Des Moines Power Station No. 2 and a 44,000-kw unit at Council Bluffs Station, both added by Iowa Power & Light Co.

● Tucson Gas, Electric Light & Power Co plans to spend $5 million this year on plant expansion with a major share going for construction of a 40,000-kw generating unit in Tucson.

● Bonneville Power Administration Administrator William A. Pearl has reported that Sam Moment, Bonneville economist, is being released from his job in an economy move and not because of his testimony at the Hells Canyon hearing in Washington, D. C. Moment, whose leave becomes effective July 1, testified at Federal Power Commission hearing against granting Idaho Power Co's application for a permit to build dams on the Snake River.

● States, counties, and municipalities in the power service area of Tennessee Valley Authority will get about $8,970,000 in lieu of taxes from the agency during fiscal year ended June 30. TVA payments to states and counties will aggregate $3,578,668, and payments to states and local governments by municipal and cooperative power distributors are estimated at about $5,391,000.

● Two small power companies in the extreme northwest corner of

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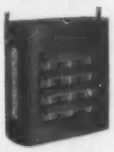

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Washington State, Clallam Bay Light & Power Co and Neah Bay Light & Power Co, have received a $150,000 loan from the Small Business Administration to build a transmission line to enable them to buy power from Bonneville Power Administration. The line will connect with a Clallam County PUD line.

Industrial Sales Parley

(*Continued from page* 97)

although they stimulate interest, they do not close sales. The only way to close sales is by personal calls on customers.

The very plants which are most electrified are the best prospects for further electrification, in the opinion of C. K. Fennel, General Electric Co. And the most outstanding accomplishments in electrification are always the results of a united team—the utility's power salesman and the manufacturer's salesman, Fennel said.

A salesman's success depends to a great extent upon his ability to understand and operate according to the similarities and differences of each individual customer, according to D. G. Adam, Fuller, Smith & Ross. The most important function of the salesman's presentation is to retain the customer's attention and convey certain information to him that will benefit him, he stated.

The largest potential market for use of electric steam generators is cleaning and sanitation, according to F. J. Riker, president, Livingstone Engineering co. The electric steam-jet cleaner, he said, is the only type of portable equipment that can be used in the factory or workroom that has no combustion fumes, flames or stack. Dry steam with concentrated detergents or solvents, Riker said, lets one man do a better job than five men using ordinary scrub brush methods.

C. F. Kreiser, Edwin L. Wiegand Co, declared one small 500-w strip heater operated 8 hours a day uses more energy in one year than a complete electric range—and does it with less connected load and with less demand. Electric heaters produce $25 to $40 per year EAR, Kreiser said. Metal sheath resistance heaters consume over 60% of the energy used for process electric heating by industry.

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1136	Fairbanks Morse	38D	1600	720	350	Baldwin	VO-6	510	450
1100	General Motors	16-278A	1600	720	320	Enterprise	DSG-6	560	450
750	General Motors	12-567	1080	720	300	General Motors	8-268A	450	1200
700	Worthington	EE-8	1000	327	200	General Motors	8-268A	350	900
500	General Motors	8-278A	750	720	150	Worthington	CC-4	225	450
500	General Motors	8-567	720	720	150	Ingersoll-Rand	S-4	225	600
500	Alco	6-12½x13T	750	600	150	Buckeye	80	240	600
480	Worthington	DD-8	700	360	100	General Motors	3-268A	150	1200
400	Sterling	VD8-8	600	1200	60	General Motors	6-71	90	1200

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2— 400 KVA Pitts., 1 Ph., 2400/4800V, 240/48V.
3— 333 KVA Whse., 1 Ph., 2400V, 600 V. sec.
2— 300 KVA G.E., 1 Ph., 13200V, 220/440V.
1— 200 KVA G.E., 3 Ph., 2400-220 sec.
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1—1000 KW Whse., 275 V. 720 RPM, 4000 Syn.
1— 200 KW Whse., 250V., 900 RPM, 4000V. Syn.
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1— 100 KW G.E., 250V, 900 RPM, 2300V. Syn.

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1— 250 H.P., West., CW, 600 RPM, 440V.
1— 200 H.P., West., CW, 600 RPM, 440V.
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4	2500	Mol.	69000—13800
4	500	West.	69000—6900
3	400	G. E.	66000/33000—2300/4160
3	333	Stand.	69000/34500—7200/12470 Y
2	200	Pitts.	66000—2300
3	1250	A. C.	44000/11500—460
4	150	West.	44000/33000—2300/6900
3	75	West.	44000—7200/12470 Y
3	5000	G. E.	38100/66000—6600
4	4500	G. E.	36000—13300—2400
2	15000	West.	35000—2400/4160 Y, 3 ph.
1	5000	West.	34500—13750, 3 ph.
3	3333	G. E.	33000/11000—2400/7200
3	333	G. E.	33000—7200/12470 Y
3	250	Mol.	33000—13800/23900 Y
3	200	A. C.	34500—2400/7200/12470 Y
3	75	Wag.	33000—7200/12470 Y
3	1250	G. E.	26400/13200—2400
4	1500	A. C.	25400/44000 Y—6900/13800
3	100	G. E.	22000—7200/12470 Y
3	50	G. E.	22000—2300
1	600	Stand.	13200—2300, 3 ph.
1	450	Penna.	13200—2400, 3 ph. ASKAREL
3	333	G. E.	13200—2300
6	200	G. E.	13200—230/460
3	150	Wag.	6900—2300
3	37½	G. E.	6900—230/460
4	150	G. E.	4800/2400—240/120
2	100	G. E.	4800/2400—240/480
3	333	G. E.	2400/4160 Y—240/480
3	250	G. E.	2300/4000 Y—115/230
3	200	West.	2400—240/480
3	150	West.	2400—230/115
1	100	G. E.	2300—575, 3 ph.
6	50	West.	2400—114/228, DRY TYPE

INDUCT REGULATORS—outdoor
1— 390 KVA G. E. Step 541 amp. 4160 V. 3 ph.
3— 96 KVA G. E. 200/400 Amp. 2400 V. 1 ph.
3— 48 KVA West. 200 Amp. 2400 V. 1 ph.
8— 36 KVA West. 150/300 Amp. 2400 V. 1 ph.
2— 36 KVA G. E. 75/150 Amp. 4800 V. 1 ph.

CIRCUIT BREAKERS
4— 800 A. 132 KV West. G-222-A-2500 MVA
2— 400 A. 37 KV G. E. FHKO-136-350 MVA
2—4000 A. 15 KV G. E. FHKO-139-1000 MVA
2—2000 A. 15 KV G. E. FHKO-239-1500 MVA
1—1200 A. 15 KV G. E. FKO-139-350 MVA
4— 600 A. 15 KV G. E. FHKO-139-750 MVA

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3 ph., 60 cy.

Qu.	KW	Make	Speed	DC Volts	DC Volts
1	3000 SU	G.E.	514	600	4000/13200
2	2000/2400	G.E.	450	250/300	2300/4600
2	2000	G.E.	514	600	6600/13200
1	2000	G.E.	500	666 25 cy.	11000
2	2000	G.E.	450	600	2300/4600
1	1500	C.W.	514	115	4000/13800
1	1500	G.E.	720	600	13200
1	1000	G.E.	900	260	4100/6900
2	1000	Whse.	900	600	2300/4150
3	1000	G.E.	720	600	2300/4600
1	750	Whse.	900	275	2300/4150
1	500	Whse.	1200	125/250	2300
1	500	Whse.	900	250	440
1	500	G.E.	720	125	2300

TURBO GENERATORS

Qu.	KW	Make	Desc.
1	4000	G.E.	Condensing—425 lbs—750° F.T.T.—Surface Condenser 3/60/2300—4000 v with exciter
1	1000	G.E.	Non-Cond—190 lbs—2400—3—60
1	1000	Moore	Condensing—Extraction—190 lbs., 2400—3—60—Surface Cond.
1	750	G.E.	Condensing—265 lbs., 440—3—60 Built 1944
1	500	Moore	Non-Cond—150/200 lbs., 5/35 lbs. B.P., 480—3—60 Dir. Conn. Exciter
1	300	G.E.	Non-Cond—150/175 lbs., 5/10 lbs. B. P., 480—3—60

FREQUENCY CHANGERS

Qu.	Kva	Make	Cycles	Voltages
1	13900	Whse.	60/25	13200 x 13200
1	3750	G.E.	60/25	4150/2400 x 2400/4150
1	3125	G.E.	25/60	4150/2400 x 2400/4150
2	2500	G.E.	25/62½	2300 x 4150
1	1250	G.E.	25/58.3	4400 x 2300
1	625	A.C.	25/60	11000 x 2300

TRANSFORMERS—60 Cycle

KVA	Make	Type	Ph	Voltages
1	5000	Whse.	OISC	3 33000x26400/13200
1	2500	Whse.	OISC	3 26400/13200 x 480
2	2000	G.E.	HVDDJ	1 66000 x 13800
1	1500	G.E.	HT	3 13200 x 2300
3	1250	G.E.	HVDDJ	6600/550
3	1000	G.E.	HVDDJ	1 2200/480

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600	*G. E.	TS-7640	1.0	900
500	*West.	TS-7657	1.0	514
400	*West.	H	.8	1800
400	West.	HG	1.0	900
300	G. E.	ATI	.8	900
300	G. E.	ATI	.8	720
300	*Ideal	SMM	.8	257
300	G. E.	ATI	.8	1200
250	G. E. (New)	TS-974Y	.8 (3 brg)	720
225	G. E.	TS-6244	1.0	300
225	Elec. Machy.		1.0	360
200	Fair-Mor.	TJC-285	.8	720
190	Elec. Machy.		1.0	720
150	Fair-Mor.	TJC-285	.8	720
150	G. E.	ATI	.8	720
150	*Elec. Machy.		.8	1200
150	Westg.	HR	1.0	300
125	*G. E.	TS-7641	1.0	514
125	*G. E.	TS-6214	1.0	277
125	*Elec. Machy.			900

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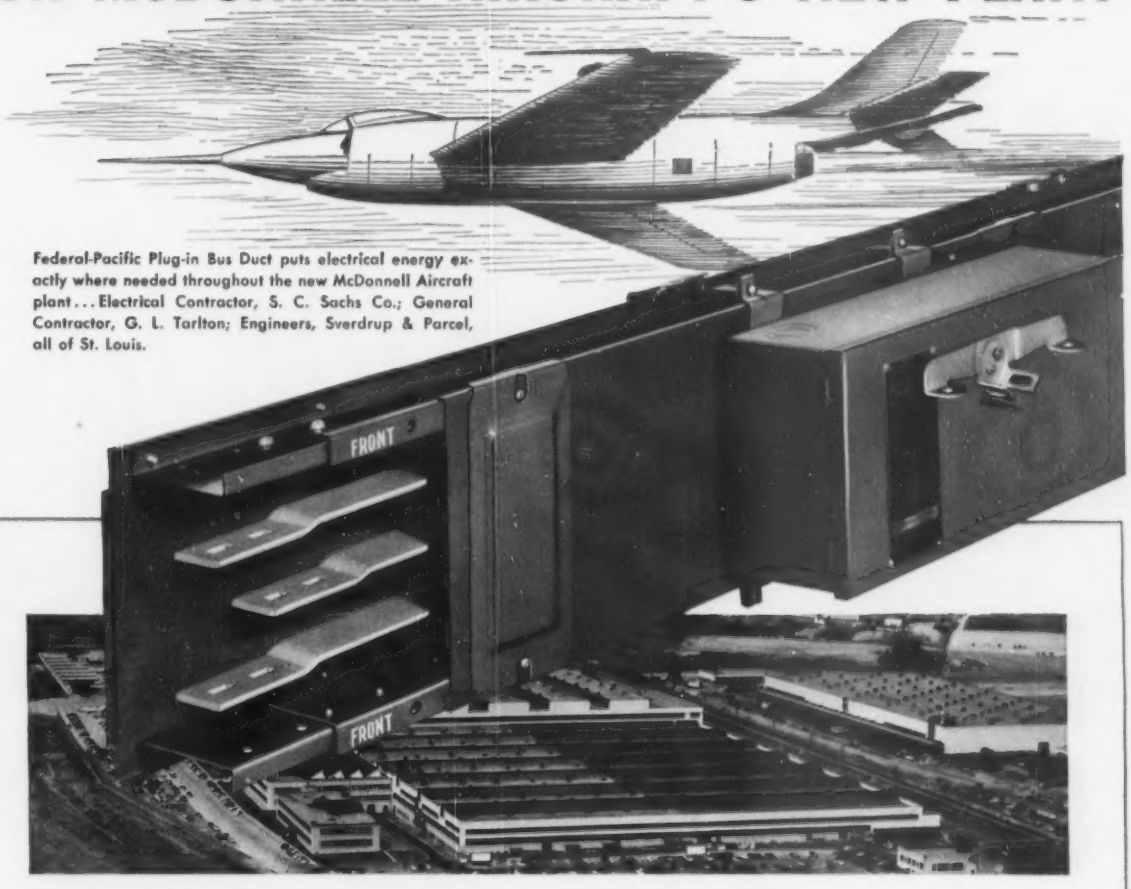

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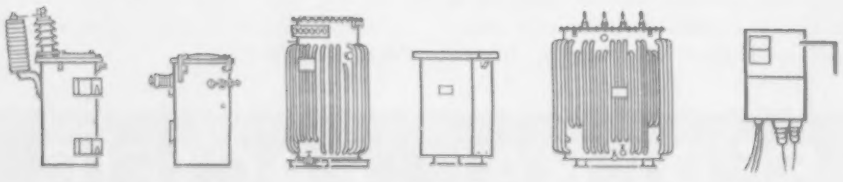

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